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CHOLECYSTOGRAPHY IN ITS APPLICATION TO THE DIAGNOSIS OF CHOLECYSTIC DISEASE*

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During the last fifteen months more than 1,100 patients have been examined at the Mayo Clinic by cholecystography. The sodium salt of tetrabromphenolphthalein and that of tetraiodophenolphthalein were each used, and each salt was administered orally and intravenously. Thus four series require separate description.

SODIUM-TETRABROMPHENOLPHTHALEIN; INTRAVENOUS ADMINISTRATION

One hundred seventy-eight patients were given sodium-tetrabromphenolphthalein intravenously.

The patients were placed in the hospital during the first twenty-four hours, were not permitted to take food or drink after 5 A. M. of the day of examination, and were given no cathartics or enemas. They were given only a glass of milk or a cup of tea at noon, a small amount of water in the afternoon, and a non-protein dinner in the evening. Full diet was resumed the next morning on dismissal from the hospital.

A dose of 4.5 gm. was fixed as the standard. The salt was added to 40 c.c. of triple distilled water, heated slowly and stirred gently until it was dissolved. It was then filtered, sterilized in a boiling water-bath for fifteen minutes and cooled to body temperature for use.

It was found that by dividing the dose the second portion was tolerated better. Accordingly, the dye was administered in two equal portions, one-half hour apart. Whenever possible the median basilic vein was selected, as thrombosis was more likely to occur if the cephalic vein were used. To avoid getting the solution outside the vein, two syringes were used, one with physiologic sodium chloride and one with dye. After free entrance to the vein was obtained with the former solution, the barrel of this syringe was disconnected and the other containing the dye was substituted. Injections were made slowly, from five to seven minutes being consumed.

Roentgenograms were made as a routine at the fifth, eighth and twenty-fourth hour after giving the dye. Occasionally films were made at other periods, also, but they were rarely of significance.

Notwithstanding the precautions mentioned, more than half the patients experienced systemic reactions in varying degree. In most cases the symptoms were trivial, but in 10 per cent the reaction was marked and in 2 per cent severe.

The typical severe reaction began within five or ten minutes with a sense of uneasiness, followed by pain in the dorsal and lumbar region, flushing of the skin, and a rise of from 10 to 50 mm. in blood pressure, followed within three to five minutes by a sharp fall. With the fall of blood pressure, patients sometimes had intestinal cramps, nausea, vomiting or incontinence of the bowel and bladder. Milder reactions were characterized by flushing of the skin, slight pain in the back and transient nausea. Occasionally a delayed reaction developed four or five hours after injection.

Hypodermic injection of 10 minims of a 1:1000 solution of adrenalin chlorid, just as the blood pressure began to rise after the initial drop, seemed to check nausea and vomiting and to restore the blood pressure to normal.

Systemic reactions occurred especially often in cases of obstruction of the common duct, in cardiovascular disease, and in persons with extremely neurotic tendencies. These conditions soon came to be regarded as contraindications to the test.

Tissue taken from the liver in a few cases at operation and examined microscopically revealed no changes attributable to the dye. By experiments on animals, certain investigators have found that necrosis of the liver may be produced by the drug

*Read before the International Congress of Radiology, London, July 1-4, 1925.

when given in quantities three or four times that required for cholecystography.

Normally, as Graham first pointed out, the gallbladder will retain sufficient dye to cast a shadow at the fourth or fifth hour after administration. This shadow attains its greatest intensity sometime between the eighth and twenty-fourth hours, becomes progressively thinner thereafter, and usually disappears between the twenty-fourth and forty-eighth hours. The shadow is regular in contour and homogeneous. It varies in size and is commonly larger at earlier than at succeeding hours.

Abnormal responses include failure of the gallbladder to fill with the dye, persistent faintness of the shadow, delayed filling, marked delay of emptying, deformity of contour, unvarying size of the shadow, and mottling, or central defects.

Thirty-nine patients of this series were operated on. All proved to have disease of the gallbladder, and twenty-five also had stones.

In nineteen of the twenty-five cases of cholelithiasis, the gallbladder failed to fill with the dye. Shadows of the gallstones themselves were visible in only six cases, either in a preliminary roentgenogram or after the dye was given. Dye entered the gallbladder in six cases; but in two of these the shadow was mottled with transparencies; in one the denser shadow of stones was seen within that of the gallbladder; and in one the gallbladder was faintly depicted at the eighth hour only. In only two cases of the twenty-five could the findings be construed as negative.

A definite lesion of the gallbladder without stones was found at operation in fourteen cases. In eight of these the gallbladder failed to fill with the dye. Its shadow was visible at the twenty-fourth hour only in one case, and at the fifth and eighth hours only in two others. No abnormalities were observed in the remaining three cases. In all of the fourteen cases the pathologist reported chronic catarrhal cholecystitis, two being of the papillomatous type, and five of the strawberry type.

SODIUM-TETRABROMPHENOLPHTHALEIN; ORAL ADMINISTRATION

Following the announcement of Menees and Robinson that they had given sodium tetrabromphenolphthalein by mouth with satisfactory results, an extended trial of this method was carried out. On the supposition that the drug was highly irritating to the stomach, it was at first given in capsules which had been hardened by dipping in a weak solution of formalin. It soon became apparent that the hardened capsules tended to pass into the large bowel undissolved. Ordinary gelatine capsules were then tried, and, as no distressing effects have ensued, their use has been continued.

No preparation of the patient is required. Preliminary catharsis and enemas are contraindicated. A dose of 0.1 gm. for each kilogram of body weight, but not exceeding 7 gm. of the dye, is given. The ordinary range is from 4 to 7 gm. Capsules of 00 size, which will hold 1 gm., may be used, but capsules of half that capacity are preferable. The patient is instructed to take the capsules at intervals during the evening meal, drinking water freely, and present himself without breakfast for examination the next morning at eight o'clock.

The first roentgenograms are made at about the twelfth hour after the dye is taken. Other films are made at the fifteenth and twentieth hours. After the fifteenth hour the patient is permitted to resume his usual meals.

Reactions following oral administration of the bromin compound have been relatively few and never grave. Occasionally complaint has been made of nausea, a few patients have vomited, and in rare instances catharsis has occurred. That the drug is not excessively irritating to the stomach is indicated by the experience of one patient who emptied his capsules into a glass of water and drank the solution without subsequent distress. One patient, who had had attacks typical of gallstone colic, suffered an attack an hour after taking the dye. As no similar instance has been observed, the attack was probably a mere coincidence. In several cases in which the examination was unsatisfactory, a repetition of the dose on the second or third day produced no ill-effects.

Shadows of the gallbladder obtained by the oral method appear later and are commonly less dense than those observed after intravenous administration. In about half the normal cases the shadow disappears by the twentieth hour. Otherwise, the principles of interpretation and the distinctions between normal and abnormal responses to the test are the same for both methods.

The bromin salt has been given orally to more than 800 patients, of whom 140 have been operated on.

At operation, seventy-one patients were found to have gallstones. In thirty-six cases of this group, no shadow of the gallbladder had been seen; shadows of the stones were evident in seven of the thirty-six. A faint shadow of the gallbladder was noted in fifteen cases. Mottling of the shadow by stones was observed in fifteen cases. In five cases the response to the test was normal.

Marked disease of the gallbladder, without stones, was discovered at operation in thirty-three cases. In sixteen of these the gallbladder had failed to cast a visible shadow with the dye, and only a faint shadow was seen in eleven. In five cases the roentgenologic findings were considered to be normal.

The third group comprised seventeen cases in which the gallbladder when removed revealed pathologic changes of minor degree. At the roentgenologic examination, the gallbladder had failed to cast a shadow in seven, and responded normally in ten.

In the fourth group of nineteen cases, the gallbladder was explored in the course of operation for other lesions, and adjudged to be normal. No abnormality had been discovered at the roentgenologic examination in sixteen of them. In three cases no shadow of the gallbladder was visible.

SODIUM-TETRAIODOPHENOLPHTHALEIN; ORAL ADMINISTRATION

Sodium-tetraiodophenolphthalein was given by mouth to a limited series of patients. Whitaker and others had previously tried this method with more or less success. The standard dose was 0.08 gm. for each kilogram of body weight, but never in excess of 6.6 gm. to a patient. At first the dye was given in salol-coated pills containing one-third of a gram each. These were taken two at a time every half hour on a fasting stomach with ample amounts of water, on the evening before the day of examination.

Nine of ten patients who received these pills experienced unpleasant effects consisting of free purgation, nausea and vomiting. Although not alarming, these symptoms were so annoying that no more of the pills were given. It is highly probable that the drug contained impurities, as other observers have noted decided reactions from the intravenous administration of the impure salt.

Later, a supply of the pure salt having been secured, it was administered in ordinary gelatin capsules of 0.5 gm. each. These the patient was instructed to take with the evening meal. Gastrointestinal disturbances have occurred much less often after this modification, but rather more frequently than with the bromin salt given orally.

Roentgenograms were made at the same periods, and under the same conditions with respect to fasting, as in the oral method with the bromin salt, and the same criteria were applied in their interpretation.

Thus far, twenty-five patients have been examined with the iodin salt by mouth. Three have been operated on. All three had given normal responses to the test. In two cases the gallbladder was considered to be normal on exploration in the course of operation for other lesions. In the third case the gallbladder was removed, but only minor pathologic changes were found.

SODIUM-TETRAIODOPHENOLPHTHALEIN; INTRAVENOUS ADMINISTRATION

Patients to whom the iodin salt was given intravenously were not placed in the hospital, but were subjected to the same dietetic regimen as those who received the bromin salt intravenously, and roentgenograms were made at the same periods. A dose of from 3 to 3.5 gm. was given, dissolved in 28 c.c. of triple distilled water, and administered at one sitting. Preparation of the solution was identical with that of the bromin salt.

No reactions occurred, and this was ascribed in part to exceptional purity and freshness of the drug. In several cases of this series the intravenous test was made as a countercheck in cases in which the examination with the bromin salt, given orally, had been unsatisfactory. Although the tests were separated by only a day or two, no reactions followed the second test. The shadows were somewhat denser than those obtained with the bromin salt.

This series comprised thirty-two patients, of whom eleven have been operated on. Three of the patients had gallstones; in two there had been no shadow of dye in the gallbladder, and in the other the shadow was mottled. Five patients had marked cholecystitis without stones; in three the gallbladder had not been depicted with the dye, while in two the shadows were normal.

Slight disease of the gallbladder was discovered in three cases; in two the roentgenologic examination had been negative, and in the third case the shadow was faint.

RATIONALE AND WEIGHT OF SIGNS

Among the cholecystographic phenomena indicative of disease, failure of the gallbladder to fill with the dye in sufficient quantity to cast a shadow seems to rank first in frequency and to be unexcelled in diagnostic value. Scarcely less reliable is constant faintness of the shadow. Potential causes of complete absence or faintness of the shadow are of two types, namely, those which interfere with entrance of the dye-laden bile into the gallbladder, and those which interfere with concentration of the bile.

A stone obstructing the cystic duct, or a large volume of stones, sand, or abnormally thickened bile in the gallbladder, should mechanically exclude or impede entrance of bile carrying the dye. Empirically, at least, this association has been found repeatedly. Swelling of the mucosa of the duct, spasm, or constricting adhesions would logically also have this effect. Mann has noted rhythmically varying differences in pressure between the gallbladder and the sphincter of the choleduct. Any disturbance causing a constant balance of pressure should hinder the inflow of bile.

Cirrhosis or other grave disease of the liver might hamper excretion of dye in the bile and thus lead to an error of interpretation, but I have encountered no such instance. It is difficult to appraise the effect of hepatitis alone because many other factors are involved, and it is a common accompaniment of cholecystic disease. Rosenthal's experiments tend to show that the liver has a large "factor of safety" and that extensive damage is required to impair hepatic function. At all events, in some cases of this series, in which hepatitis and cholecystic disease were associated, the gallbladder was normally depicted. Not infrequently the shadow of the liver is markedly dense, suggesting that the dye is not being freely excreted, but I have not been able to demonstrate any relation of this density to hepatitis, or even to defective filling of the gallbladder.

Following the introductory work of others, Rous and McMaster have proved that in the dog the gallbladder has the power of concentrating the bile, reducing its bulk by from seven to ten times. This is effected by the removal of water and inorganic salts in the proportions, practically, of physiologic sodium chlorid solution. In the human being it is doubtless this faculty which renders the normal gallbladder visible by cholecystography, accounts for the differing intensities of the shadow at different periods, and explains its common absence or faintness when the walls of the organ are diseased.

An increase of intensity followed by a diminution is the usual normal finding. This definite order is hardly to be expected always, as it may possibly be modified by the drug used, the method of administration, variation in the period of roentgenography, or failure of the patient to comply with directions as to taking food.

Mottling of the shadow demands some caution in interpretation. When produced by stones which are denser than the dye, there is little chance of error. Mottling due to transparent cholesterin stones is sometimes fairly characteristic in appearance. In many instances, however, the shadow-defects are not markedly different from those caused by gas in an overlying segment of bowel, and this source of error must be guarded against. Papillomas, if of sufficient size, should also produce mottling.

Unvarying size of the shadow at all periods may be construed as evidence that the gallbladder lacks normal elasticity. If, however, the intensity of the shadow varies and is fairly pronounced at any time, unchanging size loses force as an index of disease, and one would hardly venture to base a diagnosis on this sign alone.

By all the methods described, the normal gallbladder seldom fails to cast a shadow on the first films made. After intravenous administration of the dye, a shadow usually remains at the twenty-fourth hour. After oral administration the gallbladder may or may not be empty of dye by the twentieth hour. Moderate delay of filling or emptying, or acceleration of either, may have a significance which will be learned with experience. At present, one is obliged to construe such minor abnormalities with reserve.

Local deformities of contour were rarely observed in this series. In one case a slight flattening of the fundus seemed unrelated to the pathologic changes found at operation. In another the fundus was very pointed, but the gallbladder was deemed to be normal on surgical exploration. Adhesions about the gallbladder were present in several cases, but no deforming effects on the shadow were noted, although such a possibility is obvious.

Apparently least significant of all factors is the position of the gallbladder. In persons of the slender habitus it is usually situated low and mesially,

while in those of the broad habitus it is likely to be placed high and laterally.

ERRORS OF DIAGNOSIS

Despite all care some errors of interpretation seem as yet to be unavoidable, both on the affirmative and negative sides. The affirmative diagnoses of disease appear to be well sustained, and there were few disappointments in the series.

Negative findings with the dye tend to be somewhat less reliable. Occasionally a definitely diseased gallbladder will respond normally to the test as now generally conducted. Even the shadow of a gallbladder containing stones may sometimes have normal characteristics in general.

The most serious obstacle to the accuracy of a negative diagnosis is the gallbladder in which are only minute pathologic changes, probably a residue from more pronounced disease in the past. Such a gallbladder more often responds normally to cholecystography and may be apparently normal on surgical exploration. If the history warrants its removal, it will seldom fail to reveal at least microscopic evidence of disease.

But the failures of the test are not so numerous or glaring as to require apology. Since cholecystography is now at a stage comparable to that of roentgenography of the digestive tract when the opaque meal was first coming into use, it is reasonable to anticipate an increase in its efficiency. With improvement of technic and refinement of interpretation, much more should be learned both as to normal and abnormal responses.

COMPARISON OF METHODS

Intravenous administration of the dye offers advantages in more direct control of the patient, certainty that the specified dose of the drug has been given and emphasis of the shadows obtained. Its disadvantages are the requirement of a punctilious technic and the hazard of local or systemic reactions. With identical technic, the bromin salt given intravenously seems to be more provocative of systemic reactions than the iodin salt, if the latter is pure.

Simplicity and freedom from grave reactions are the principal advantages of oral administration. With either salt, nausea and purgation ensue occasionally. The iodin combination, even when pure, seems to produce these discomforts more often than the bromin. Vomiting after taking either drug, unless early, has apparently had no material effect on the shadow. It has seemed to occur less frequently in patients with diseased gallbladders than in patients who responded normally to the test and were believed to have no such disease. Dye in the intestinal contents produces shadows which may be a little confusing and might possibly conceal the shadow of the gallbladder, but such circumstances are infrequent. Lack of certainty that all of the drug has been taken is another minor objection. The question may also arise as to whether defective absorption from the intestine may not be a cause of abnormal findings. However, all these objections and doubts seem to have little basis, for in this series the diagnostic results from all methods have been about equal.

From these considerations it will be apparent that my present preference is for the oral use of the bromin salt as a routine, and the iodin intravenously to check doubtful cases.

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I have taken this text because it seems to meet a vital need in medical practice today. Medical education has extended and broadened to a point where we are turning out better scientists than doctors. Attention is being concentrated upon the disease to the exclusion of the suffering patient. Exhaustive laboratory methods and technical tests can never take the place of the intimate personal attention and encouragement the sick man craves. Too much science and too little human interest drives him to the quack, where he receives a personality study, a satisfaction for mental distress, and some treatment at least for the symptoms of which he complains. He has been treated as a man who is sick rather than as the possessor of an interesting disease; or, he has received a careful consideration of his complaints, rather than a brusque statement that physical and laboratory examinations show there is nothing the matter with him. We have wandered in our search for truth too far from the "old-time doctor" attitude toward his patient. Too often the patient has been the mere vehicle of an interesting disease and the pathology of the condition has occupied the center of the stage to the exclusion of the patient himself. Either this, or, finding no pathology, we have lost interest, become impatient, and dismissed one unfit for life through mental suffering. What the quack cures is not always "imaginary" ills. The physical basis may be slight, but it is very real to the patient. He persuades himself he has a very serious condition. A vicious circle is formed. Fear masters him. Sleep and appetite fail or are impaired. He becomes introspective, morbid and depressed, exercises less, becomes over-careful of his diet. He then develops a host of minor symptoms consequent to his changed habits of living, but which he believes due to his disease. We have presented to us, then, the typical psycho-neurotic, who comprises from one-third to one-half of every general practitioner's practice, who is the least understood and the most in need of understanding. We have the type who wanders from physician to physician, and, failing to be understood, finally forsakes orthodox methods, falls into the first trap set by quackery and is often cured.—Rock Sleyster, Wis. Med. Jour., Dec., 1924.

PRACTICAL CONSIDERATIONS IN THE DIAGNOSIS OF CHRONIC ABDOMINAL DISEASE*

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Perhaps the greatest single factor in the diagnosis of chronic abdominal disease is the ability to establish definitely the presence or absence of a lesion in the stomach or duodenum. With almost any type of abdominal lesion, if the manifestations are chronic rather than acute, the distress is mainly referable to the digestive tract, and dyspeptic symptoms are in the foreground. Eliminating malignancy from consideration, these symptoms fall into two main groups: reflex dyspepsia and ulcer dyspepsia. The common causes for the former, in the order of their frequency, are: chronic constipation, especially if the patient has the cathartic or enema habit; cholecystitis, with or without stones; chronic appendicitis; the degenerative hepatic diseases, such as the cirrhoses, and chronic pancreatitis. In this connection it might be said that dyspepsia is also common in disease of the urinary tract or pelvic organs, although its symptomatic importance is so secondary as rarely to complicate the diagnostic situation.

Of this entire group, only the dyspepsia associated with chronic cholecystitis exhibits sufficiently definite and constant features to constitute a syndrome of differential importance. One outstanding feature of this digestive upset, as of all reflex dyspepsia, is its tendency to constancy rather than intermittency. Qualitative food distress is a constant feature, and food selection in this group is governed by certain principles with considerable uniformity. Aside from the characteristic but possibly infrequent acute attacks of gallbladder colic, definite pain is not a feature. The dyspeptic symptoms occur immediately after the ingestion of food and tend to improve as the upper digestive tract empties itself. The distress is entirely in the upper abdomen, and characterized as a distension or full feeling with pressure upward and a constant desire to belch. There is burning distress in the stomach with acid eructations, usually definitely

*Read before the Rock Island and Scott County Medical Society, Moline, Illinois, April 14, 1925.
Also read before the Southern Minnesota Medical Association, Owatonna, May, 1925.

but temporarily relieved by soda. A careful selection of diet, cutting out all fats, the greasy or fried foods; highly acid foods, such as many of the raw fruits; and well-known indigestibles, such as cabbage, pickles, salads, and so forth, will markedly improve this type of dyspepsia.

The single condition, contributing perhaps to more instances of serious gastro-intestinal upset than any other, is the one variously referred to as neurosis, chronic nervous exhaustion, or neurasthenia. A group of 100 cases was studied in which the foregoing condition was diagnosed. While the symptoms ascribed to functional neurosis are legion, and their multiplicity is their characteristic feature, in 26 per cent of the patients coming to the Clinic with functional troubles the presenting complaint is referable to the stomach.

The clinical picture of chronic nervous exhaustion is characteristic. Usually, although a presenting complaint is mentioned first, there is also a conglomeration of more or less distressing symptoms affecting all the systems and regions of the body. The background of family characteristics, early life and environment, and the evidence of constitutional nervous instability, form a picture to which the elaborate modern examination is a relatively unimportant adjunct. The striking feature about nervous dyspepsia is the amount of distress that these patients may suffer. Disability or complete prostration are not at all unusual, while in cases of uncomplicated ulcer they are the exception, and when they exist the completeness or accuracy of the diagnosis should be questioned. The distress in cases of nervous dyspepsia comes very soon after the ingestion of food. There is usually some relief from soda, but relief from food is practically never obtained. The characteristic thing about the qualitative food distress is its complete lack of uniformity, either in the group or the individual. It follows no dietary principles and exhibits no rationale. Personal idiosyncrasy is the dominant factor, and the tendency is to deplete the diet to the point of malnutrition and serious constipation.

Eliminating from consideration once and for all such obsolete diagnosis as "chronic gastritis" and "catarrh of the stomach," the more common diseases of the upper digestive tract practically narrow themselves to carcinoma of the stomach and gastric and duodenal ulcer. Carcinoma manifests itself as a more or less rapidly progressive, wasting disease, with a train of symptoms that need no discussion here. The difficulty of diagnosis exists mainly in the first few months.

The statistics recorded here are from the personal observation and review of 100 cases of duodenal ulcer, in which the diagnosis was corroborated at operation. From a symptomatic standpoint, the four most important features in the diagnosis of peptic ulcer are chronicity, intermittency, meal relation, and food ease. These four points, of almost equal importance, form the framework about which the ulcer syndrome is constructed. Chronicity in this connection has a two-fold meaning: first, that the condition does not tend to be self-limiting, but rather to exist for years; and, second, that if uncomplicated it is distinctly nonprostrating. The average duration of symptoms in the series studied was eleven and one-half years, and the longest was forty-nine years, while only in 8 per cent was it less than two years.

Periodicity, meal relation, and food ease are so uniformly present that they are almost essential to the diagnosis. In 90 per cent of the histories studied, the symptoms were definitely intermittent; 91 per cent of the patients described the pain or distress as coming on from one and one-half to four hours after meals, and in 97 per cent the distress was relieved completely, or to a large extent, by taking food or soda. The small percentage of cases not showing these features were carefully studied, and the discrepancy can be explained either by the presence of serious complicating features, such as perforation, gastric retention, or disease in the gallbladder, or by the inability of the examiner to procure a satisfactory history, mainly from patients who do not speak English.

A history of previous hemorrhage was obtained in 16 per cent of the cases. This symptom has never assumed any great importance from a diagnostic standpoint. A relatively small percentage of the patients who come to the Clinic primarily on account of vomiting or spitting up blood are found to have ulcer, while a history of hemorrhage, to say nothing of its dependability, is elicited in a relatively small percentage of cases of definite ulcer. Sixty-eight per cent of the patients observed gave a history of being frequently awakened between midnight and 2 or 3 a. m. with distress similar to that complained of at other times, and which could be relieved by food or alkali.

There was a seasonal incidence of distress in only 28 per cent; vomiting, not associated with gastric retention, occurred in only 15 per cent.

These percentages are given to indicate the relative importance of the classical symptoms of ulcer. The diagnosis of ulcer does not, fortunately, rest on the clinical picture alone, but with modern methods of examination the importance of the clinical picture is frequently underestimated, not merely as it affects diagnosis, but as it may affect treatment and prognosis.

Without doubt, the most important recent development in the diagnosis of disease of the upper intestinal tract has been roentgenology with the opaque meal. It must not be forgotten, however, that this is the most difficult field in the whole scope of *x*-ray diagnosis, and except in the hands of an experienced and competent roentgenologist is of less value than a good clinical opinion. An increasing number of patients are coming with a diagnosis of ulcer which we are unable to verify. On the other hand, however, when our diagnosis has been ulcer, previous opinion has usually agreed with it. To paraphrase an old saying: Many things resemble an ulcer, but an ulcer resembles nothing else.

During 1924, in the Mayo Clinic, 11,895 *x*-ray examinations of the esophagus, stomach, and duodenum were made. There were 834 patients on whom a primary operation was performed for duodenal or gastric ulcer. In 3.83 per cent, a negative diagnosis was made from the *x*-ray, and an ulcer was found at operation. In 2.65 per cent the reverse was true, making a total error of 6.5 per cent. In 1921, Carman reported an error of 10 per cent. We come now to a consideration of the real value of the clinical picture. First it must be understood that one is not able, from the *x*-ray, to distinguish between an active ulcer and either a symptomless or a healed ulcer. A study of postmortem statistics forces the conclusion that many ulcers exist for varying lengths of time and heal spontaneously, never producing sufficient distress to send the person to a physician. The co-existence of other abdominal lesions with an ulcer, or the importance of the ulcer as a cause of the chief complaints, are matters on which the *x*-ray can throw no light, and the necessity for their accurate determination cannot be underestimated. It is interesting to note that, aside from the small group of definite postoperative complications, the great majority of patients dissatisfied with the results of an operation for ulcer are those in whose preoperative history the definite ulcer syndrome is either absent or insignificant. It must be borne in mind that an ulcer and a functional syndrome may be contributing equally to a train of symptoms which, in the patient's mind, is due to a single cause. A severe migraine is more distressing than the average ulcer dyspepsia, and if both are present the migraine is likely to be the disturbance for which relief is sought.

CONCLUSIONS

An essential feature in the diagnosis of abdominal complaints is the proving or ruling out of lesions in the stomach or duodenum. Roentgenology, when its findings are reliably interpreted, is the most valuable aid in this process. Clinical judgment and experience have not been discredited by the development of modern laboratory resources and are still the deciding factor in the final summing up of the evidence. Diagnosis is fruitless if it has not pointed the way to treatment. Unnecessary or poorly conceived treatment, especially surgical, still constitutes the greatest indictment of the medical profession.

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WHAT CONSTITUTES A SATISFACTORY DRUG?

A good summary of the requirements for a drug that can be considered a satisfactory therapeutic agent has been compiled by W. G. Christiansen of the Medical School of Harvard University. The first dictum is that the essential therapeutic dose should be far below the toxic dose. Ease of administration is extremely advantageous. Stability is a quality of great value. Drugs that are readily soluble and are rapidly absorbed are to be preferred. Drugs for injection should not only be soluble, but should withstand sterilization and should not injure the tissues. To act efficiently, the substance should not be excreted or destroyed in the body before it has had time to act on the infective agent, nor should it be excreted so slowly that cumulation in the internal organs gives rise to symptoms of poisoning. Finally, tolerance to the drug should not be readily developed by the parasite against which the drug is to be used.

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THE LUNGS IN INFANCY AND CHILDHOOD

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As usually employed in physiology, the term respiration refers to the process of gaseous exchange between an organism and its environment, consisting essentially in the absorption of oxygen and the elimination of carbon dioxide. Respiration in some form is one of the fundamental characteristics of all living things. In unicellular organisms the gaseous exchange takes place directly, but in the more complex animals a special form of respiratory apparatus is developed to carry on this function.

The foundation of our present knowledge of respiration we owe to Lavoisier, the discoverer of oxygen. By his epochal work from 1771 to 1780, he explained combustion as an oxidation, and showed that in respiration the same process occurs, in that the blood takes up oxygen from the inspired air, and gives back to it the products of combustion developed within the body, namely, carbon dioxide and water.

The beginning of the advance in our knowledge of lung capacity dates from the invention of the spirometer by Hutchinson in 1859, and augmented subsequently by the perfection of methods of analysis of the expired air. It is the consideration of lung capacity, particularly the vital capacity, and tidal air in children with which this paper is concerned. Before entering into a discussion of these measurements, a general consideration of certain features of respiration in children as compared with adults will be attempted.

The act of inspiration results in an enlargement of the thoracic cavity produced by the descent of the diaphragm and by the elevation of the ribs. The descent of the dome of the diaphragm enlarges the chest cavity mainly in the vertical direction. A rise of pressure which is transmitted to the abdominal cavity causes the abdominal walls to protrude and results in what is spoken of as diaphragmatic or abdominal respiration. In this type of respiration the abdomen bulges outward first, followed immediately by a wavelike upward expansion of the movement which is gradually lost over the thoracic region. This is the general type of inspiratory movement characteristic of children and also of adult males. In girls after the age of puberty a more marked movement in the thoracic region is often encountered. Here the upward rotation of the downward slanting ribs enlarges the chest in the lateral and also in the dorsoventral directions. Undue emphasis apparently has been placed upon this costal or thoracic type of respiration in considering it a sexual characteristic of females, for in women, particularly of foreign countries, who have not the custom of wearing tight corsets, the abdominal type of respiration predominates. Furthermore, if tight dresses are discarded, in time little or no difference is found in the respiratory movements of the two sexes. The natural type of respiratory movement is one fairly well balanced between the chest and abdomen, the abdominal type being somewhat more pronounced. In labored respiration, however, the thoracic movements are greatly increased.

In the fetal period the lungs and other thoracic viscera completely fill the chest, the lungs being completely atelectatic. The *x*-ray plate of the chest of the stillborn infant shows the thorax and abdomen to be ovoid in shape, with the lower ribs flaring somewhat to conform with the wide upper portion of the abdomen. The upper pole of the thoracic cavity is narrow, and the ribs slope definitely downward. There is an even density throughout the lung fields, making it impossible to differentiate the heart shadow from the lung tissue. Immediately after respiration starts there is a distinct change in the contour of the chest. The ribs become elevated and extend horizontally at right angles to the spine rather than downward as found in fetal life. It is not until considerably later that the downward slanting of the ribs characteristic of the adult is again developed. The entrance of air into the lungs brings the heart and mediastinal shadows into clear relief in the *x*-ray plate.

The horizontal circumference at the nipples (Scammon and Rucker) is markedly increased with the first inspiration. Within twelve hours after the birth the circumference begins to decrease, which continues for two or three days. Later the chest circumference again increases, and in the second week of life regains the initial circumference present at the first inspiration.

The anteroposterior and transverse diameters show similar changes. Before birth the thoracic index (*i.e.*, the relationship between the antero-

posterior to the transverse diameter) at the nipples is about 86. With the establishment of respiration the anteroposterior diameter increases to such an extent as to exceed the transverse diameter. The thoracic index therefore rises to an average of 106 with the first inspiration and later drops to about 102 in the first twenty-four hours. By the middle of the second week it has decreased to slightly more than 100. With the beginning of respiration therefore the sternum moves upward and forward, greatly increasing the anteroposterior diameter of the chest. Later in the adult the chest is flattened to such an extent that the thoracic index is between 70 and 75.

During respiration the intrapulmonic pressure undergoes slight fluctuations. When at rest, the air pressure within the lungs is equal to the atmospheric pressure. With quiet inspiration the intrapulmonic pressure falls 9 to 10 mm. of water below atmospheric pressure. In normal expiration a rise occurs of about 8 mm. of water. Forced expiration and inspiration, however, may cause fluctuations of 80 to 100 mm. of mercury.

The first successful determinations of the pressure within the pleural cavities apparently were made by Aron in 1891. He found that in adults the pressure within the pleural cavities is slightly lower than the atmospheric pressure. This is due to the fact that the atmospheric pressure distending the lungs is reduced by an amount equal to the elastic recoil of the distended lung tissues. Aron measured the intrapleural pressure by means of a cannula connected directly with the pleural cavity in thirty-six healthy adults. At the end of quiet inspiration the negative pressure was found to be 4.64 mm. of mercury and 3.02 mm. of mercury at the end of expiration. With quiet respiration therefore the variation in intrathoracic pressure amounts to about 1.02 mm. of mercury. The development of a negative intrathoracic pressure apparently is a postnatal process. After birth, until the fourth day, Hermann (1883) was unable to demonstrate a measurable negative measure in the pleural spaces. By the eighth day he found a negative pressure of only 0.4 mm. of mercury. The early development of a negative intrathoracic pressure no doubt exerts a favorable influence in counteracting any tendency for a return of pulmonary atelectasis characteristic of fetal life. The very low intrathoracic pressure in the infant probably has some influence upon the vital capacity of the lungs at this period. This point will be considered later.

The volume of air expired during a single quiet respiration has been determined by Von Recklinghausen (1896) for the newborn. On the day following birth in quiet respiration during sleep a normal infant weighing 3,000 grams expired an average of 19.5 cm. at a single expiration. Since the respiratory rate was 62 per minute, approximately 1,200 c.c. of air were expired in one minute. During the first nine days after birth the amount expired averaged about 22 c.c. The amount of air passing through the lungs per minute for each kilo body weight amounts to about 400 c.c. for the newborn. The averages found by other observers for the tidal air during the newborn period are somewhat higher than those of Von Recklinghausen. Dohrn (1858) found an average of 38 c.c. on the first day, 44 c.c. on the fifth day, and 50 c.c. on the tenth day. During crying, the tidal air increases about 8 c.c. per inspiration. In older children Gregor found the tidal air to average about 129 c.c. at twelve months, 220 c.c. at seven days, and 395 c.c. at fourteen years. For the adult weighing about 60 kgm. the tidal air is approximately 500 c.c. Since the respiratory rate at this age is in the neighborhood of sixteen per minute, about 9,000 c.c. of air pass through the lungs in this length of time, which amounts to about 150 c.c. per minute for each kilo body weight. If we accept the findings of Von Recklinghausen the pulmonary ventilation per unit of weight occurs nearly threefold as rapidly in the newborn as in the adult. From the period of infancy to the adult, the findings indicate that the tidal air increases approximately twenty-five times, whereas the volume of air passing through the lungs per minute increases only seven and a half times.

The volume of the undistended lungs was found by Cuby (1880) to be about 75 c.c. at birth and 1,600 c.c. for the adult male. The tidal air therefore equals nearly one-third of the total lung volume both in the newborn and in the adult.

Although 500 c.c. of air are breathed in at a single inspiration by an adult, considerably less than this amount enters the alveoli with each respiration. It is estimated by Loewy that the volume of the bronchial tree in adults is about 140 c.c. At each respiration therefore only about 360 c.c. of air enters the alveoli. Under normal conditions the amount of air in the lungs in adults at the end

of quiet expiration is about 2,600 c.c. The addition of 360 c.c. on inspiration adds about one-seventh to the volume of air of each alveolus provided the air is evenly disseminated throughout the lungs. Once in the alveoli, diffusion occurs very rapidly, as shown by the experiments of Griehant. He breathed in 500 c.c. of hydrogen and then determined the amounts breathed out in successive expirations. About 170 c.c. were recovered in the first expiration, 180 c.c. in the second, 41 in the third and 40 in the fourth.

The air in the alveoli is in contact with a vast expanse of alveolar epithelium. It is estimated that the total surface area of the pulmonary alveoli is 900,000 sq. cm. in the adult as compared with 55,000 sq. cm. at birth. As pointed out by Loewy and Von Schratte (1905), this large alveolar surface area makes possible for more than 6,000 c.c. of oxygen to diffuse into the blood per minute. Normally, however, in quiet breathing only 250 to 300 c.c. of oxygen are absorbed per minute, and not more than ten times this amount in violent respiration. This large surface area present in the lung of adults is developed largely by the postnatal growth in size of the pulmonary alveoli rather than due to an increase in the number of alveoli. It is estimated that after birth the number of alveoli increases only 1 to 2 per cent; however, there is a very great increase in the size of the alveoli.

Studies of the vital capacity of the lungs have revealed many interesting features, particularly in recent years. In adult man the vital capacity averages about 3,700 to 4,000 c.c. At this period, as shown by Dreyer (1919), the vital capacity bears a fairly constant relationship to the 9.72 power of the weight in grams, to the square of the sitting height in cm. and to the square of the chest circumference in cm. The average value for the constant expressing the relationship to the sitting height, as obtained by Dreyer, for males is 1.9. This value is also obtained for children after they have reached a sitting height of 87 cm. and above. For smaller children the value for this constant becomes progressively greater, amounting to 2.71 for children having a sitting height of 53 cm. From this it follows that the vital capacity is relatively smaller in young children than in older individuals. If the tendency is for the vital capacity to become progressively smaller the younger the child, one would naturally expect this measurement to be exceedingly small at birth, although to date apparently no observations have been made at this period.

In the adult the vital capacity of the lungs includes the tidal air or the volume inspired during quiet respiration, the complemental air or the greatest amount possible to force into the lungs after a quiet inspiration, and also the supplemental air or the maximum amount that may be expelled from the lungs after quiet expiration. At birth, since there is no negative pressure in the pleural spaces, the lungs are completely emptied with quiet expiration except for residual air. At this period evidently there is practically no supplemental air present in the lungs. In the newborn, therefore, the vital capacity includes only the tidal and complemental air, and consequently must be relatively much smaller than at older ages. The attainment of the normal adult relationship, so far as the vital capacity is concerned, probably is dependent in a measure upon the complete development of the supplemental air, as well as the complete voluntary control over the muscles of inspiration and expiration.

The requisite of an unusually rapid pulmonary ventilation with a relatively small vital capacity in the newborn are probably factors accounting for the great seriousness of pulmonary pathology during this period. Difficulties in respiration are very frequent in the newborn infant, and various methods of artificial respiration are often employed in treating such conditions. In a series of cases reported by Evans (1922), where insufflation of the lungs at birth was done, by means of a gas machine, apparently little demonstrable change was produced in the lung. In all cases, however, air had been forced into the stomach and intestines, the distension of which might have a deleterious effect upon respiration. Evans also was unable to inflate the lungs of the stillborn by means of a tracheal catheter. By this method the alveoli were easily ruptured, with the development of a pneumothorax. He states that usually a pressure of 10 mm. of mercury is considered the upper limit of safety in forcible expansion of the lungs in infancy.

Although at present the vital capacity has not been determined for the period of infancy and early childhood, nevertheless, rather extensive observations are recorded in the literature for children six years of age and older. These studies have shown conclusively that the vital capacity averages greater in boys than in girls of the same age and

size. Since at corresponding ages and sizes the observations show a considerable degree of variability, some difficulty is occasionally experienced in interpreting readings in individual cases. Statistical analysis of data for children (Stewart, 1922) indicates that 75 per cent of the child population have vital capacities equal to or above 90 per cent of the average for corresponding age or size, whereas only 25 per cent of children have vital capacities falling 10 per cent or more below their expected normal. By computing the extent of the deviation of individual readings from the expected normal vital capacity, one may readily classify the patient as to the group to which the child belongs. Children falling into the group representing the poorer one-fourth of the child population are children who probably deserve special study to eliminate pulmonary or cardiac disease as a factor causing their low standard of physical fitness.

In clinical work single determinations of the vital capacity are of value in connection with the examination of patients having disease of the heart or lungs. Repeated measurements, however, are of greater value in permitting the physician to follow the course of the disease, for changes in the pathological conditions are immediately reflected by fluctuations in the vital capacity of the lungs. It is undoubtedly inadvisable to rely upon the determination of the vital capacity to the exclusion of other means of making a diagnosis, for occasionally this measurement is very misleading, and might lead to serious error if relied upon alone. However, with the exercise of proper judgment, one usually is able to use the vital capacity findings safely and profitably in determining the presence and also roughly the extent and progress of the disease of the heart or lungs.

SUMMARY

1. The horizontal circumference of the chest at the level of the nipples is markedly increased with the first inspiration. Within twelve hours after birth the circumference begins to decrease, which continues for two or three days. Later the chest circumference again increases, and in the second week of life regains the initial circumference present at the first inspiration. The anteroposterior and transverse diameters show similar changes.

2. With the first inspiration the thoracic index increases from 86 to 106. By the middle of the second week it has decreased to slightly more than 100. Later in the adult the chest is flattened to such an extent that the thoracic index is between 70 and 75.

3. At birth there is no demonstrable negative pressure within the pleural cavities, and by the eighth day it amounts to only 0.4 mm. of mercury. In the adult the negative intrathoracic pressure is 3.02 mm. of mercury at the end of quiet expiration, and increases 1.62 mm. of mercury on quiet inspiration.

4. The volume of air expired during a single quiet expiration is about 19.5 c.c. on the first day of life, and about 500 c.c. for the adult.

5. The volume of air passing through the lungs per minute for each kilo body weight is nearly threefold as great in the newborn as in the adult.

6. The vital capacity of the lungs is relatively small in young children, particularly in the newborn. The normal adult relationships are not developed until about the age of puberty.

7. Determinations of the vital capacity of the lungs have a distinct clinical value, for observations have demonstrated that the development of changes in pathological conditions of either the heart or the lungs immediately influence the vital capacity of the lungs.

IMMUNIZATION AGAINST SCARLET FEVER

Probably the best estimate of immunization with scarlet fever toxin is contained in the following quotation from an article by George F. Dick and Gladys Henry Dick of the skin test for susceptibility to scarlet fever and the preventive immunization with scarlet fever streptococcus toxin: "The New York City Health Department has employed scarlet fever toxin in preventive immunization on a large scale, but has given it in doses too small completely to immunize a majority of susceptible persons. Zingher (The Dick Test in Normal Persons and in Acute and Convalescent Scarlet Fever Cases, The Journal, Aug. 9, 1924, p. 432) reported the use of 100, 250, and 500 skin test doses, a total of 850 skin test doses. Toxin put up in this inadequate dosage has been widely distributed by commercial firms." The report of the Dicks shows that when from 1,000 to 3,000 skin test doses were injected, only 14.3 per cent were completely immunized. When from 5,000 to 6,000 skin test doses were injected, 66 per cent were completely immunized. When from 10,000 to 12,500 skin test doses were injected, 91.8 per cent were completely immunized. Correct increase of dosage is all-important.

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INDIRECT INGUINAL HERNIA AND ITS RELATION TO ACCIDENTS AND WORKMEN'S COMPENSATION*

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The word hernia is probably derived from a Greek word meaning a branch or offshoot. The ancients used the Latin word, kele (a swelling), and combined it with a word which designated the contents of the swelling, such as enterocele or intestinal hernias, and cystocele, meaning bladder hernia. The oldest printed Latin editions of the Bible used the word herniosis and Chaucer in the fifteenth century used the word hirnia.

Inguinal hernia is doubtless as old as the history of man. Among the ancient records a Phoenician statuette of about 900 B. C. shows a double inguinal hernia treated by a bandage. Hippocrates in the fourth century B. C. wrote about hernia. The Roman physician, Celsus, who lived in the first century, was the first to operate for hernia. He made an incision over the hernia, loosened the sac, and probably ligated and removed it. He thought it was both unnecessary and dangerous to open it. In large hernias he cauterized the parts with caustic or a hot iron. Celsus speaks of practitioners who placed the empty sac between pieces of wood and applied pressure until gangrene developed.

Antiseptic surgery, introduced by Lister, ushered in a new period in the treatment of hernia. Open operations displaced the blind and uncertain procedures of the past with the result that more progress was made in twenty years than in all the centuries that had gone before.

A knowledge of the anatomy of oblique inguinal hernia is necessary to an understanding of the cause of hernia. A consideration of the anatomy of the inguinal region shows this to be congenitally a weak point in the abdominal wall.

The inguinal canal along which inguinal hernia travels is an oblique opening in the abdominal wall about an inch and a half long parallel to the inner half of Poupart's ligament and a little above it. It extends from the internal abdominal ring to the external or superficial abdominal ring. (In the male, after the descent of the testis at about the sixth month of fetal life, the canal contains the ilio-inguinal nerve, the genital branch of the genito-crural nerve and the spermatic cord.

Little has been added to our knowledge of the descent of the testis since the observations made by John Hunter in 1762. In early fetal life the testes are located at the back of the abdominal cavity behind the peritoneum and below the kidneys. During the seventh or eighth month the inguinal conus and attached testis are drawn downward into the inguinal canal and through it until shortly before birth the testis reaches its position in the scrotum. The retroperitoneal position of the testis is always retained, the testis and the constituents of the spermatic cord descending outside of the peritoneal pouch which extends into the scrotum.

For a time free intra-abdominal communication is maintained by the tubular processus vaginalis. Usually by the time of the birth or shortly after, this canal is obliterated. The processus vaginalis is the entire pouch of peritoneum which accompanies the testis and cord. It is divided into two portions, the funicular process, which surrounds the cord, and the tunica vaginalis testis, which surrounds the testis.

If the processus vaginalis does not become obliterated, a congenital hernial sac results which may become a hernia either at birth or in later life. In 1899 Russell of Australia stated that all oblique inguinal hernias in both adults and children were congenital in origin and were due to a persistent patent funicular process. In his further study of this subject he made the following conclusions:

1. The inguinal hernia in young subjects is caused by the presence of a congenital sac and there is no other cause.

2. Acquired hernia in the young has no existence in fact.

3. All cases of oblique inguinal hernia occurring at any time of life occur in subjects who are the possessors of a congenital sac.

4. Subjects who have never possessed a sac or who have had the sac efficiently removed can never become the subjects of oblique hernia.

5. I am unable to find any evidence of any kind in favor of the belief that oblique inguinal hernia ever occurs at any age independently of the presence of a congenital sac.

Social legislation in the way of compensation laws brought hernia into the courts with all its medico-legal questions.

*Read at the midsummer Range meeting of the St. Louis County Medical Society, August 8, 1925.

Mock, in his excellent book on industrial surgery, speaks of a new viewpoint that began to permeate industry during the first ten years of the present century. He says that it was characterized by a greater consideration of the rights of the workingman by his employer, a more humane attitude which took into account certain moral responsibilities not included in the purely legal obligations. This new attitude on the part of industry was exemplified by the fact that some of these companies paid full wages during disability.

Whenever an accident occurred, if there was any moral responsibility attached, even though legally they might sidestep the laws, compensation and free surgical care were given. The question of legal rights did not enter into the plan of these industries. They recognized certain moral responsibilities and needs, realizing that it was good business to improve the conditions of their employes and thereby make them more useful and efficient. Among such broad-minded employers, the question of whether there was such a thing as traumatic hernia for which they could be held legally responsible did not cause much concern. They were not governed by the decisions of established medicine nor of established law, but based their decision on a good and just business sense. If they employed a man with hernia they knew the industry was not responsible for it. If it grew gradually worse, without any cause, again they were not responsible. But if, as a result of accident or severe strain, the hernia became strangulated, at once doubt as to responsibility entered the case and the decision was rendered in favor of the employe. If they hired a man who showed no sign of rupture at the employment examination, but later suffered an accident or severe occupational strain and as a result hernia appeared, compensation and free surgical care were given because in the man's mind the accident caused the trouble. From the standpoint of efficiency it was found that a man with hernia was about 25 per cent less efficient than the man without one. Therefore, these concerns might refuse to employ men with a rupture, but they became more and more liberal regarding the repair of such a condition when it developed in the old employes. Such, says Mock, was the attitude of several concerns at the time of the pasasge of the employes' compensation acts. In fact, these very laws were an expression of this new, humane influence which had entered industry. The administration of these acts was placed in the hands of industrial commissions who were laymen rather than lawyers. Influenced by the generous attitude of certain industries and guided by this sentiment and a consideration of moral rights, the decisions of these commissions were often very liberal. Thus employes began to seek compensation for many conditions which heretofore had never been considered compensable and included among these were hernias which developed during employment.

If all industries and companies took the same liberal and broad-minded attitude toward compensation of hernia that these companies of which Mock speaks took previous to the passage of compensation laws, there would be very little controversy or conflict over the matter of compensation for hernias said to have appeared during labor hours, for under such a system of liberality on the part of the employer practically all hernias would be compensated without question. However, this liberal and wide-open policy is not the general attitude of employing companies. The companies and industries are undoubtedly all willing to compensate an actual injury, but when there is a question as to whether there has been an actual injury to the employe, they are not always willing to pay the claim without trial in the courts or before the industrial commissions for final decision. Among the claims that are contested by both the employer and the employe we find hernia to be one of the fields of the greatest controversy and dispute.

Compensation laws are a part of social legislation. Social legislation dates as far back as the middle ages, but until the latter part of the nineteenth century, medicine had little concern with such legislation. The Emperor of Germany in 1881 first advocated the adequate protection from injury of the workingman by the passage of compensation laws. Three years later such a law went into effect in Germany. In 1887 Austria passed a compensation law. Norway's first law providing for compensation dates from 1894. England's first real social legislation was enacted in 1897. Denmark, France and Italy have had compensation laws since 1899. Hungary, Norway, Sweden, Holland, Belgium, Luxemburg, Switzerland, Spain, Finland and Australia all have compensation laws. In our own country we were slow in taking up this cause of the injured workingman, but at the present

time practically all of our states have enacted some form of compensation laws. It has really become a nation-wide movement and with the development of this particular branch of social legislation has come a corresponding development of medicine in its relation to industry. The demands that have been made upon us and are being made upon us as physicians by employers, employes and industrial commissions have compelled us to obtain more knowledge of trauma and its effects. We will have to study more of the rôle which trauma plays in the etiology of various diseases, and we will have to learn to put a more and more equitable value upon permanent disability from injuries and permanent partial disabilities from injuries. We must learn to make a prognosis in these cases which is based upon experience and observation of a large number of cases and not on a mere guess.

Since the passage of these compensation laws and the large amount of controversy that has arisen over the compensation of hernias, many papers have appeared in medical literature on this subject.

Berger, in the opening sentence of his well known monograph, goes far to explain the entire foundation of the voluminous discussion as to hernias and accidents when he says: "There is not an individual who having a hernia at the moment when he noticed its existence did not at once attribute it to an accident." So we have a fixed idea inherent in the human race to combat as well as the opinion of referees, boards and courts. Many surgeons believe that practically no hernias are of traumatic origin and that they should not be compensated. Many labor leaders and social workers believe that all hernias are traumatic and that all should be compensated. The logic of the matter is just the same as it usually is in the case of extremes—that the truth lies somewhere between the two.

Wainwright, who has had a large experience in industrial surgery, says that it is his feeling that the present, legal and lay attitude is unsound, unscientific and is at variance with firmly established medical facts and that the attitude of courts and compensation boards is chaotic. Many authors think that confusion has arisen from the use of the word *rupture* as synonymous with *hernia.*

Rupture is an old English word and indicated disease; but that is not the modern understanding of the word. To every one now, it means a tear and therefore an accident. As one author states, a biased conception is formed by the tearing and ripping sound of the cold word, *rupture.*

As a result of the study of oblique inguinal hernia as related to accident and compensation, a review of the literature seems to show a general division of hernia into the following types:

Hernia by direct external violence, the true traumatic hernia. These cases, though very rare, do occur. The external force is that caused by a more or less sharp body which produces considerable subcutaneous laceration of tissues. In connection with traumatic hernia by direct violence it is claimed by authorities that it should be remembered that localized blows, however violent to other parts of the abdomen, never yet have produced and never will produce inguinal hernia. Widespread contusion of the abdomen may rarely cause inguinal hernia.

Patterson, as chief of the Division of Industrial Hygiene and Engineering, Pennsylvania Department of Labor and Industry, has had unusual facilities for broad observation of this question and has published a very able article. He has given a very interesting review showing the attitude of various compensation boards on the question of hernia, clearly showing how different their views and rulings are. His own opinion is that hernia in practically every case, except in those very rare cases where a traumatism causes a break in the abdominal wall, is the result of a prenatal, anatomical defect and should be classed as a disease and not as an accident. Patterson considers that all cases will be considered as either congenital or of slow development and not compensable, being a disease rather than an accidental injury, unless conclusive proof is offered that the hernia was immediately caused by such sudden effort or severe strain that:

1. Immediate descent of the hernia followed the alleged causative injury or strain.
2. There was severe pain in the hernial region.
3. There was such prostration that the employe was compelled to cease work immediately.
4. The above symptoms were of such severity that the same were noticed by the claimant and communicated it to the employer within twenty-four hours after the occurrence.
5. There was such physical pain that the attendance of a licensed physician was required within twenty-five hours after the occurrence of the hernia.
6. The trauma or strain must be adequate.

Where two or more of the criteria are lacking, it is claimed a case cannot be justly maintained to be one of traumatic origin. In the true traumatic hernia all six of Patterson's criteria of the typical compensable hernia will be present, more particularly since such a force must produce considerable subcutaneous laceration of the tissues.

Admitting, then, that all true traumatic hernias, though rare, are compensable, there is another class that is taken up under Caption No. II, called Hernias of Effort or the French hernia of force. These hernias are of two types. Type 1, a hernia alleged to be due to muscular effort and appearing suddenly and immediately under adequate and convincing circumstances, is occasionally met. If a man can reasonably establish that he had no hernia before a certain episode; if this episode was accompanied by a sufficient effort to make possible the stretching and tearing of muscles in parts previously intact; if the immediate results are such that any medical man who has had the matter explained to him must realize that it would have to be the cause; that is, if the other five criteria of Patterson are present along with the adequate force just mentioned—then a compensable hernia has been produced. Type 2 of these hernias of effort are hernias that are alleged to be due to muscular strain and to appear gradually and shortly after trivial effort and under inadequate and convincing circumstances. This type of hernias form the greatest number of claims for compensation for hernia that are made, because they form by far the largest percentage of all hernias—possibly 90 per cent. They are responsible for the greatest number of contests before the industrial boards and courts. Employes with this type of hernia are, however, exactly those in whom there is always a congenital sac. The hernia has been forming slowly for months or years. The process has been painless. The claimant has been quite unaware that it was going on. The most trivial muscular efforts at work, at play, or at home, physiologic functions, such as coughing, sneezing, strains, defecation, or micturition have all been helping over a long time gradually and painlessly to dilate the internal ring, spread open the persistent process and force intestine or omentum into the congenital sac. The hernia has, in all probability, already been present for some time before the trivial incident calls the man's attention to his groin.

The last strain is not the cause of the man's having a hernia any more than any other of the countless strains that perhaps ever since birth have gradually been helping to produce the final result. As Morehead has well said, it is no more logical to hold this final strain to be the cause of the hernia that has been slowly developing for months than it is to consider the last expulsive effort of a woman in labor to be the cause of another human infant being born. The last labor pain is no more the cause of a baby than a thousand other incidents of the past nine months. Another illustration more directly apropos is the following: Someone has told of a young foreigner who, to avoid military service, provided himself with a stick which at frequent intervals he placed across his groin and struck with a hammer. After long perseverance he finally produced double direct inguinal hernia. The last blow of the hammer was not the cause of the hernia, any more than was the first or any one of the intermediate ones. Yet, if, instead of the last self-inflicted blow, he had received an accidental blow of a hammer at work, he would ask, and in many states receive, compensation. In other words, compensation boards would hold that it was the last blow of the hammer which caused the hernia. The practical phase of these slowly developing hernias is this: In persons with a persistent funicular process, hernia is going to occur; the hernia will come anyway, work or no work.

In this group of hernias, Type 2 of the hernias of effort, over which there is so much dispute as to whether they are compensable or not—

1. The six criteria of Patterson of a true compensable hernia are conspicuously absent.

2. In the vast majority of cases the hernia has already been present and the alleged injury only calls attention to it.

3. If the alleged injury really did force viscera into the waiting sac, it has simply produced a further stage in a naturally progressing process and has in no way created a new condition demanding compensation for the final product.

4. Similarly, if an old hernia is made larger by a strain at work, it creates no new condition demanding compensation for the final product.

5. Any result to receive any consideration at all must be immediately present.

I think we will agree as to the fairness of Wainwright when he says: "I feel as much as anyone that a person with a hernia justly caused by work

should be compensated. Also, I am just as glad as anyone to see assistance given to disabled employes. I believe, however, that the employer should be protected from fraud. He should not be made to pay for an old hernia and he should not be made to pay for a hernia that was not actually caused by work, nor in the gradually developing hernias should he be compelled to purchase the final product because the job happens to be finished while the man is in his employ. In fairness to all, a law that involves a scientific medical question should be determined in accordance with the best scientific medical knowledge on that question."

Dr. Coley of New York, who has had such an immense experience in hernias in the Hospital for the Ruptured and Crippled in New York City, about five thousand a year, in speaking of this classification of hernias into the true traumatic type which are all compensable and the hernias of effort, Type 1 of which is considered compensable and Type 2 of which furnishes a great field of debate as to their compensability, says:

"Personally, I would prefer to divide hernias into two classes—traumatic hernia as above described due to a violence resulting in laceration and perforation of the abdominal wall, and the second class to include all other cases."

He says the larger one's experience with hernia, not only from the clinical but operative standpoint, the more strongly does he become convinced that the underlying cause of hernia is practically always the presence of a pre-formed, unobliterated sac extending for a longer or shorter distance down the inguinal canal, a potential hernia. The second important consideration is that an actual hernia practically never occurs as the result of a single fall, blow or slipping or any of the ordinary causes attributed to hernia, nor does it occur from a single increase in intra-abdominal pressure, no matter how great. Anyone of these causative factors received innumerable times gradually dilates the pouch until it attains such size that any little force of some sort or other causes it to dilate sufficiently to make some of the intestine or omentum enter it, a portion large enough to be detected by palpation or inspection.

In connection with this I would like to bring attention to the matter of the single strain or force. The medical witness testifying before the commission is often asked by the attorney whether or not a single force or strain may not cause an indirect inguinal hernia. Especially is one apt to be asked this question when he has testified to the effect that a hernia is first caused primarily by the preformed sac and secondarily by strains to which the individual has been subjected throughout all his life and that in the opinion of the medical witness the last strain has not been more important than all the other strains.

This is a question on which the medical witness is apt to be unwilling to express an absolutely positive opinion. Apparently Dr. Coley is quite positive that a single strain or force or increase in the intra-abdominal pressure will not produce a hernia and he states further in this connection that it is a very important question and one that has given rise to much dispute in a medico-legal way. He quotes MacCready, the greatest English authority on hernias, as saying that hernia is never due to this cause, and also quotes Graser, one of the highest German authorities, as saying that a hernia complete in all its parts can never arise at the moment of accident or by a single increase in the intra-abdominal tension, be it ever so great.

When one is confronted with a hernia, the history of the alleged injury is most important. The examining surgeon should learn first the nature of the man's usual work and usual muscular effort. He then should determine as exactly as possible the nature of the force—what was the weight; how many were carrying; did others let go; was there a severe effort to maintain equilibrium after a stumble or slip; what was the attitude at the moment of the force (strain with legs apart and the body bent forward is said to be the most conducive to the development of hernia). Inquiry should next determine the immediate results—what was the character of the pain; was it immediate; how long did it last; were there other symptoms, vomiting, collapse, etc.; was work interrupted and for how long; when was the swelling first noticed; what physical description does the claimant give of it? The examining physician should further be furnished with whatever evidence there may be from bystanders, co-employes and any physicians that may have seen the claimant before he did. Searching inquiry should be made as to the possibility of hernia in childhood and into the previous industrial history—what is the duration of the present work; has there been a recent change from a sedentary to a laborious occupation? Thus it will be seen that the preliminary inquiry should

of itself almost determine the judgment. It should develop completely how far the six criteria mentioned by Patterson and quoted above are established. Every bit of evidence which can be collected must be carefully weighed before deciding whether the hernia is due to natural causes making it non-compensable, or whether it is due to unnatural causes and therefore compensable.

Mock, and other authorities, state that in favor of the hernia being due to natural causes we have the following:

1. History or knowledge of a hernia already existing. This implies at once the necessity of thoroughly examining all applicants for work and all old employes and carefully recording the presence or absence of hernia.

2. History of hernia in childhood which was apparently cured by the truss and has not been present for several years.

3. Presence of hernia at some other abdominal orifice showing a tendency toward this condition.

4. Weakness of the structures forming the walls of the inguinal canal.

5. A family history of hernias is a strong etiologic factor in favor of the employe being congenitally predisposed to the condition.

6. The age of the patient is an important factor in determining the natural or unnatural cause of the hernia.

7. Other etiologic factors such as recent debilitating diseases, bronchitis, prolonged constipation, faulty posture, visceroptosis, etc.

8. Certain conditions during examination of the hernia which indicate that it was due to natural causes; for example, a large hernia indicates its pre-existence. Discoloration or deep depression of the skin over the hernia indicates that a truss has been worn and therefore a hernia must have existed.

In favor of the hernia being due to unnatural causes and therefore compensable, we have the following:

1. Definite proof that the hernia did not exist previously. This is not always easy to obtain unless there are records of examination of employes, as one can not depend upon the testimony of the individual. Even though he may be ever so honest, he may be mistaken. Coley states in his large experience of some five thousand hernias a year at the Hospital of the Ruptured and Crippled in New York City that very frequently people come to them who have a hernia and do not know it.

2. A definite history of an accident occurring coincidentally with straining or a severe effort, far in excess of that which the man's muscular development, stature, or past experience in the occupation should call for. Such factors would compose the unnatural occupational hazards as opposed to the natural strains of his ordinary work.

3. The appearance of a hernia immediately or very shortly after the occurrence of one of these unnatural exciting causes. The sudden appearance is usually evidenced by the employe complaining of pain, reporting the condition to one or more fellow-employes, and seeking medical attention very shortly afterward.

The authorities generally agree that the final decision as to whether a hernia is compensable or not must often depend on the findings at the operation. All who have been on the witness stand as medical witnesses before the referee know that one will be asked by attorneys and referees as to the condition of the sac at operation. Wainwright puts it very well when he says: "The operative findings will frequently definitely decide in the case of a hernia as to whether the hernia is an old or a new one." One error, however, that is frequently made is to consider that a small, thin, non-adherent empty sac is necessarily a recent one. The fact is that this kind of a sac is the typical persistent funicular process. Its length depends on how far the obliterative process has been completed but otherwise it may be as thin and delicate as it was at the time of birth. It remains so if not interfered with until old age. It is only the presence of hernial contents which develops thickening, adhesions, and the other appearances which we ordinarily associate with an old hernia. The changes which we ordinarily accept as indicating long standing have begun only when abdominal contents have been forced into these delicate structures and have set up irritation. The longer the delicate type of sac, the more certain it is to be congenital. If adherent to the tunical vaginalis or connected with it by a fibrous band, it is certainly a congenital sac. In the presence of this type of sac, unless there are other signs, it may be impossible to form any idea as to how long ago it began to harbor from time to time some of the abdominal contents; that is, we can be quite sure that the sac is congenital, but we can form no idea as to how long ago a real

hernia began. No matter whether the sac is a mere dimple at the internal ring or a complete failure of obliteration or anything between the two, there will be no pathologic changes until abdominal contents are driven in and cause irritation. When the sac is thickened and adherent to the surrounding tissues, we know that the hernia itself is an old one, the age depending in general upon the degree of thickening. Adherent intestines and omentum, chronically congested or inflamed omentum, especially if adherent down to the bottom of the sac with itself adherent to the tunical vaginalis, prove hernias of long standing, at least several years.

In most unusual circumstances, extravasation of blood and other signs of acute trauma will be present and will probably indicate a true traumatic hernia. Strong muscle structures making up the canal and ring may still be present long after the first appearance of a hernia, especially if it was not large and if the contents are only occasionally down. Weak, atrophied muscles with large lax rings, especially with the pillars of the external oblique stretched and poorly identified, are secondary developments due to the long continued stretching of large hernial contents and always indicate old hernias. This evidence thus obtained at operation should be carefully noted, as it may be of great benefit in determining whether a hernia is compensable or noncompensable.

Mock says, Industrial Commissions all over the country are depending on the surgeons in industry to arrive at a just and equitable decision concerning this subject of compensable hernia. The first essential is to make a careful physical examination of all employes and to record those that have real or potential hernias. Whenever a hernia develops in one of those employes who was recorded not to have a hernia, a careful analysis of his case must be made to determine:

1. Was it entirely due to pre-existing defect.
2. Was it entirely due to some severe direct or indirect violence.
3. Was a latent condition already present and only aggravated by the unnatural occupational hazard.
4. Was it due entirely to natural causes.
5. Or was it due to a combination of all these and, if so, which was the most responsible.

Every surgeon must then keep a careful record of his methods of determining these points. Whenever one of these hernias is operated a careful description of the condition of the sac and the contents must be made with a view of determining which are the recently formed hernias and which are old. From these records it will be possible to standardize definite methods of justly deciding which are compensable hernias.

Medical literature on this phase of hernia, covering American, French, English and German literature, is rather convincing in that every writer has agreed more or less in complete detail to the effect that the large percentage of indirect inguinal hernias are not due primarily to accident or injury, but to the pre-formed sac. Among prominent American surgeons so writing are C. H. Mayo, Arthur Dean Bevan, Willys Andrews, Wm. B. Coley and many others. Due to the testimony of eminent surgeons who have had large experience, state industrial commissions are declining more than formerly to recognize hernias as compensable accidents. In a memorandum in the Workman's Compensation Decisions of the State of Minnesota, the rules of the Minnesota State Commission, I am informed, are quite well set forth. I quote as follows from the memorandum:

"Hernia claims have always been troublesome in connection with the compensation act; and their adjustment probably always will be accompanied with a great deal of doubt and uncertainty. The compensation laws of a number of the states provide definitely that in order to be entitled to compensation for hernia a workman must prove clearly seven things:

1. That the hernia is of recent origin.
2. That its appearance was accompanied by pain.
3. That it was immediately preceded by some accidental strains suffered in the course of the employment.
4. That it did not exist prior to the date of the alleged injury.
5. That it was accompanied by immediate total disability.
6. That immediate medical treatment was necessary, and
7. That the employer was notified within a short period of time after the alleged injury."

In view of all this discussion on the compensability of hernia, it behooves us as physicians when we come in contact with any cases of hernia which are apt to bring up medico-legal questions and

come before the industrial commissions and courts for trial that we study very carefully all the facts in the case and that we keep a careful record of these facts so that when we go on the witness stand, as medical experts, we may be more fully and perfectly prepared to answer all questions that may be propounded to us by the referee and the counsel for the plaintiff and the counsel for the defense to the end that our testimony may be truly scientific and in accord with established medical facts and to the end that we may thus give a fair, honest, unbiased and scientific medical opinion, and to the further end that justice may be done to both the employer and the employe.

DIGESTIVE ENZYME THERAPY ON THE WANE

Not so very many years ago, many physicians would have considered it a handicap to be deprived of the use of digestive enzymes in their daily prescribing. Even the most conscientious, while resisting the alluring color and pleasing taste of a widely advertised elixir claimed to contain pepsin, pancreatin and diastase, nevertheless gave pepsin in certain conditions, diastase in others and in cases of supposed pancreatin deficiency, pancreatin in the hope that the latter would safely reach its destination and have some action. Today a vast majority of clinicians make little or no use of digestive enzymes. The report of W. A. Bastedo on the use and utility of digestive enzymes summarizes the replies to a questionnaire submitted at the request of the Council on Pharmacy and Chemistry to the members of the American Gastroenterological Association and brings out forcibly that gastric ferments are considered of minor importance in therapeutics. The report fully justifies the estimate of the Council on Pharmacy and Chemistry which states in the chapter on digestive enzymes in New and Nonofficial Remedies that the utility or need for the internal administration of digestive enzymes is problematic. The Bastedo report is additional evidence of the untiring efforts of the Council to supply the medical profession with up-to-date and impartial information in regard to the actions and value of drugs.

(Jour. A. M. A., Sept. 19, 1925, p. 905.)

BICHLORIDOL AND SALICIDOL NOT ACCEPTABLE FOR N. N. R.

The Council on Pharmacy and Chemistry reports that "Bichloridol" and "Salicidol" are the proprietary, uninforming names applied to suspensions, respectively, of mercuric chlorid and mercuric salicylate intended for intramuscular administration. These preparations are manufactured by the Collapsule Co., Inc., New York, and marketed by the H. A. Metz Laboratories, Inc., New York. The Council found "Bichloridol" and "Salicidol" inadmissible to New and Non-official Remedies because they are marketed with indefinite statements of composition and under nondescriptive, proprietary names.

(Jour. A. M. A., Sept. 5, 1925, p. 764.)

THE GRADING OF CARCINOMA*

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In the past the physician was content with a simple diagnosis of cancer, but he has now reached a point in his knowledge of the disease where such diagnosis is not entirely satisfactory, because cancers vary in their gross and microscopic appearance, and also in their effect on the human body. The physician and the layman not only want to know the type of cancer they are dealing with, but also its grade of malignancy, since the grading has a very important bearing on prognosis and treatment. Cancers have been classified largely according to gross form, density, duration and cause. This practice brought out such descriptive terms as papillary, infiltrating, ulcerating, napkin-ring, cystic, colloid, encephaloid, scirrhous, fulminating, buyo-cheek, chimney-sweeps', kangri, paraffin, pitch-workers', smokers', and tar.

From a practical standpoint, carcinomas fall into two general groups, those arising from the regenerative cells of protective epithelium, such as the skin, lining of the mouth, urinary bladder, and vagina, known as epitheliomas or epidermoid carcinomas, and those arising from the regenerative cells of gland or secretory epithelium, such as are found in the gastro-intestinal tract, gallbladder, breast, prostate and thyroid gland, known as adenocarcinomas.

The first group can be divided into squamous-cell epithelioma, which represents about 80 per cent of all epitheliomas; basal-cell epithelioma; melanotic epithelioma; nonmelanotic melano-epithelioma, or the white blackberry type of melano-epithelioma; adamantine epithelioma, or adamantinoma; and mixed epithelioma. These epitheliomas, to a great extent, are named according to the way their cells tend to differentiate. Squamous-cell epitheliomas have a tendency to differentiate into squamous cells; basal cell epitheliomas have a tendency to differentiate into cells that closely resemble normal basal cells. Melanotic epitheliomas have a tendency to differentiate into melanin-producing cells. Nonmelanotic melano-epitheliomas belong to the melano-epithelioma family,

*Read before the Minnesota State Medical Association, Minneapolis, April 27-29, 1925.

but they do not produce melanin. They have the same cell appearance as the nonpigmented areas of melano-epitheliomas, and it is reasonable to believe that, should their cells differentiate far enough, melanin would be produced. It is believed that the adamantinoma arises from the enamel organ and that its cells differentiate into a sort of adamantine substance, but they usually degenerate and form cysts before reaching this stage.

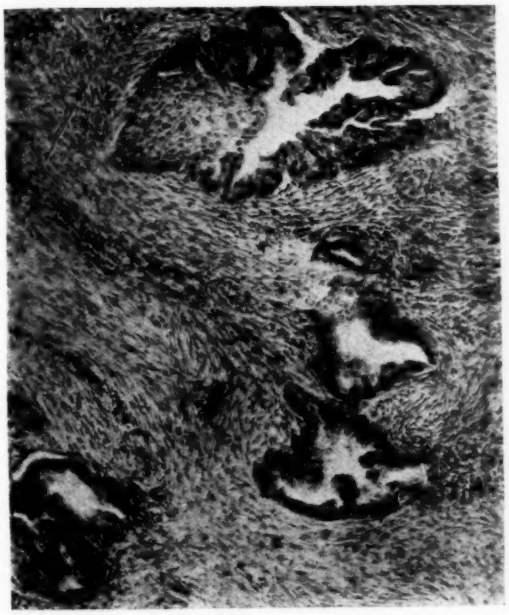

Fig. 1. Carcinoma of the gallbladder. Both squamous and gland epithelium are shown in the same acinus.

Fig. 2. Adenocarcinoma of cecum, graded 2. Bone is intimately associated with the growth.

I have been able to trace the origin of three of these neoplasms from the epithelium of the gum, which leads me to believe that more of them might be found to have such an origin if discovered early. The admantinoma appears to be more closely related to the squamous-cell epithelioma than to any other type.

The cells of a mixed epithelioma, or carcinoma, have a tendency to differentiate into both a glandular and a protective type of epithelium. Cancers that arise from the regenerative cells of gland or secretory epithelium should be termed adenocarcinoma, or gland carcinoma, because whenever differentiation takes place it is usually toward a gland or secretory type of epithelium. Mucoid or colloid carcinoma is an adenocarcinoma with a tendency to differentiate to the extent that a mucus-like substance is produced. A scirrhous carcinoma is an adenocarcinoma that is meeting with marked resistance on the part of the host, as manifested by an excessive amount of fibrous tissue that is thrown around the carcinoma cells.

A certain type of carcinoma is sometimes seen growing in the location of another, such as a squamous-cell epithelioma of the gallbladder or stomach, or an adenocarcinoma that has originated from the regenerative cells of the epidermis; or a squamous-cell epithelioma and an adenocarcinoma may be found in the same neoplasm. In certain cancers of the gallbladder, part of the neoplasm is made up of squamous-cell epithelioma and part of adenocarcinoma. I have seen a carcinomatous acinus in which one side is squamous epithelium and the other side gland epithelium (Fig. 1). In this case the regenerative cells had an inherent capacity to produce both a gland type and a squamous or protective type of cell. No confusion need be caused by the appearance of squamous epithelium in a neoplasm of a tissue that normally contains no such epithelium. It is not necessary to assume the presence of misplaced squamous epi-

thelium or cell rests. The endometrium of the everted uterus responds to the need for protection by producing squamous epithelium, showing that the regenerative cells of the endometrium are capable of producing either gland epithelium or squamous epithelium, according to the use to which the tissue is to be put. In this adjustment to changed environment, as in the variations of malignant cells in the gallbladder, the process is one of cell evolution, not one of cell confusion. Gland structures such as the breast, and sweat and sebaceous glands, develop from the regenerative cells of the skin. If gland structures develop from the regenerative cells of protective epithelium, and protective epithelium from the regenerative cells of gland structures either normally or under nonmalignant conditions, why should not a similar condition be seen in carcinoma, since it is the product of epithelial cells?

Not only are there combinations of adenocarcinoma and epithelioma in one neoplasm, but there is more than one type of epithelioma.

The so-called mixed tumor of the parotid is a slow growing adenocarcinoma that has cartilage and sometimes bone around its cells for protective purposes. I have seen an adenocarcinoma of the cecum with bone associated with it (Fig. 2). This bone is in the neoplasm, but not of it. Its presence is purely defensive on the part of the host, just as the presence of fibrous connective tissue. Cartilage and bone are often found in tonsils that show chronic inflammation. If one of these tonsils had an epithelioma along with the cartilage and bone, it would not be right to speak of it as a mixed tumor.

It is possible that true teratomas spring from cells of a fairly wide totipotency. The more undifferentiated a cell, the greater is its totipotency. The fertilized ovum is the most totipotent of all cells, because from it the whole organism is developed by the process of differentiation.

In a recent article I have endeavored to point out how a number of carcinomas, by the process of differentiation, put the brakes on themselves, so to speak (Fig. 3). Squamous-cell epitheliomas control themselves by differentiating into keratin, which, when found in circumscribed masses, are called pearly bodies, and into cells which, if they do not contain keratin, have differentiated beyond their ability to reproduce, such as the large, flat squamous cells.

Basal-cell epitheliomas control themselves by producing cells similar to the normal basal cells of the skin, and melano-epitheliomas by producing melanin, which is a product of the epithelial cells and indicates an attempt at self-control.

Adenocarcinomas control themselves by differentiating into gland or gland-like structures, sometimes with the production of colloid, mucus, or a mucoid or pseudo-mucinous material. Primary carcinoma of the liver has been known to produce bile.

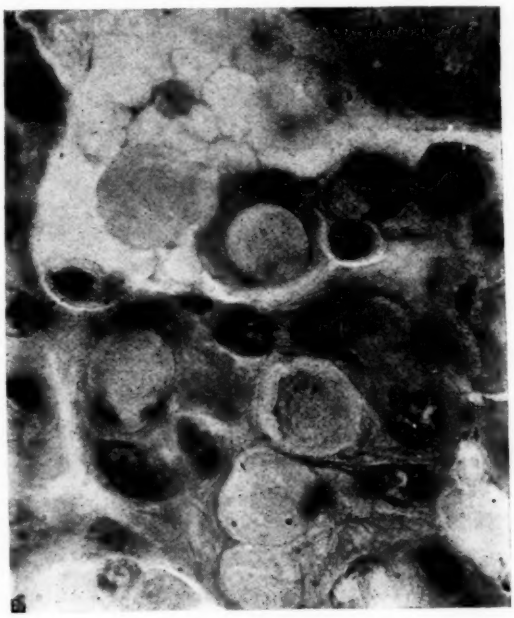

Fig. 3. Squamous-cell epithelioma of the skin. A number of cells are shown differentiating into keratin.

It is quite obvious that a carcinoma whose cells increase by geometric progression, without differentiation beyond the point of reproduction, would grow faster and be more malignant than one that caused a number of its cells to differentiate beyond the point of reproduction. If there is such a thing as spontaneous cure of carcinoma, it is probably caused by complete differentiation of all of its cells, or differentiation beyond the point of reproduction.

The so-called scirrhous carcinoma is usually highly malignant; it meets a high grade of resistance, but the carcinoma usually wins. Some carcinomas are a type of natural-born fighters, and the more resistance they encounter the harder they

fight, which is evidenced by cells of the carcinoma of the so-called leather-bottle stomach that becomes so undifferentiated it is difficult, in some instances, to know whether one is dealing with carcinoma or sarcoma. But these highly undifferentiated cells will often show their colors by attempting to form acini when they reach an area where they meet less resistance.

In 1915, I began grading malignant neoplasms on the basis of cell differentiation, and during the following four years 2,000 epitheliomas were intensively studied. Of this number, 1,628 squamous-cell epitheliomas were graded strictly from a microscopic standpoint, quite independent of the clinical histories, on a scale of 1 to 4, as follows: 146 (8.96 per cent) grade 1; 788 (48.40 per cent) grade 2; 508 (31.20 per cent) grade 3, and 186 (11.42 per cent) grade 4. The basis of the grading, published in 1920, is as follows: "If an epithelioma shows a marked tendency to differentiate, that is, if about three-fourths of its structure is differentiated epithelium, and one-fourth undifferentiated, it is graded 1; if the the differentiated and undifferentiated epithelium are about equal, it is graded 2; if the undifferentiated epithelium forms about three-fourths and the differentiated about one-fourth of the growth, it is graded 3, and if there is no tendency of the cells to differentiate, it is graded 4. Of course, the number of mitotic figures and the number of cells with single, large, deeply staining nucleoli (one-eyed cells) play an important part in the grading." The mitotic figures and the one-eyed cells are undifferentiated calls, and really should be considered only as such; however, when mitotic figures are numerous, especially if they are irregular, one is inclined to raise the grade slightly.

Fig. 4. Squamous-cell epithelioma of the lip, graded 1. Marked differentiation is shown.

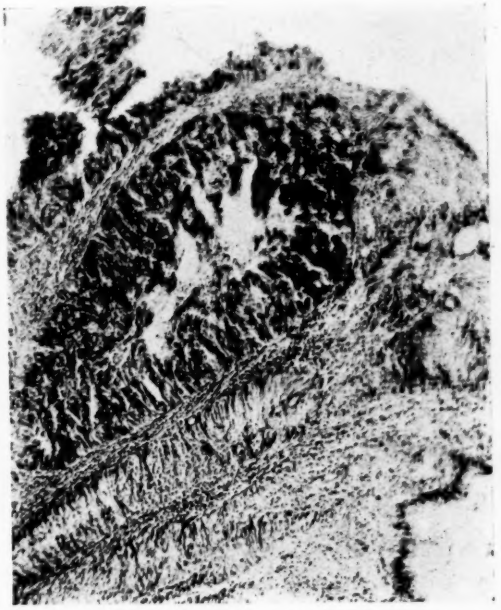

Fig. 5. Adenocarcinoma of the sigmoid, graded 3.

After nine years of experience with the grading of epitheliomas, I believe that the system of grading should be slightly revised; that is, instead of a grade 1, in which about three-fourths of the cells are differentiated and one fourth undifferentiated, should be substituted grade 1, in which differentiation or self-control ranges from almost 100 to 75 per cent, and undifferentiation from 0 to 25 per cent (Fig. 4). Grade 2 should represent a carcinoma in which differentiation or self-control ranges from 75 to 50 per cent, and undifferentiation from 25 to 50 per cent (Fig. 2). Grade 3 represents carcinoma in which differentiation or self-control ranges from 50 to 25 per cent, and undifferentiation from 50 to 75 per cent (Fig. 5). Grade 4 represents carcinoma in which differentiation or self-

control ranges from 25 per cent to practically 0, and undifferentiation from 75 to about 100 per cent (Fig. 6). So far as an estimation of the ultimate result is concerned, this revision will have no effect on grades 1 and 2, but will affect slightly grades 3 and 4. In other words, the most malignant of the grade 3 neoplasms will be classified in grade 4.

Up to November 1, 1924, after excluding the inoperable cases and the cases in which death occurred immediately after operation, complete data were obtained in 880 cases of graded epitheliomas:

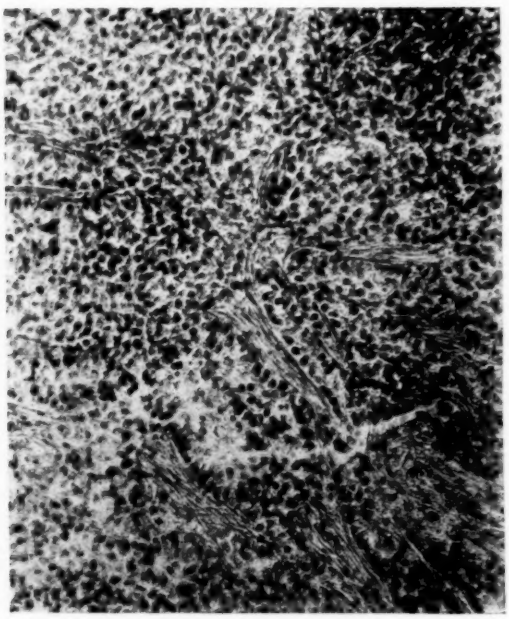

Fig. 6. Adenocarcinoma of the stomach, graded 4.

82 (9.31 per cent) were of grade 1; 407 (46.25 per cent) were of grade 2; 282 (32.04 per cent) were of grade 3; and 109 (12.38 per cent) were of grade 4.

In the first group, good results were obtained in 90.20 per cent; in the second group, good results were obtained in 62.16 per cent; in the third group, good results were obtained in 24.82 per cent, and in the fourth group, good results were obtained in only 10.09 per cent.

MALIGNANT TUMORS OF THE THYMUS: WITH REPORT OF A CASE*

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Glendive, Montana.

Not a great many cases of malignancy of the thymus have been described. Schridde[1] says, "With the exception of bone marrow, the thymus is the organ in the body poorest in tumors." In 1896 Hoffman[2] collected thirty-five cases. Rubaschow[3] in 1911 added thirty-six more. Since then, twenty-three cases have been reported.[4-24] In 1917 Dr. Bell, of the University of Minnesota,[13] reviewed seventy-three cases "grouped by the several authors as follows: 27 lymphosarcoma, 3 round cell sarcoma, 2 fibrosarcoma, 19 other varieties of sarcoma and sarcoma without special designation, 10 carcinoma, 6 thymoma, 1 fibroma, 5 miscellaneous."

Anatomy.—The reticulum of the thymus is formed from the infolding epithelial tubes from the third branchial clefts (Stohr[25]). These clefts meet in the midline, the lumen is lost and the cells proliferate. On this all of the authorities agree. The origin of the parenchyma cells, however, is a matter of debate. These cells have the appearance of small lymphocytes, and cannot be distinguished from lymphocytes. If they are true lymphocytes, then they must arise from the mesoderm and infiltrate the reticulum of epithelial origin. All other lymphoid organs are supposed to be formed in this way (Hammar,[26] Wiesel,[27] Maximow[28]). Ewing[29] states that the parenchyma cells have not been successfully distinguished from lymphocytes by many studies directed to their morphology, microchemical reactions, serological relations or behavior in most pathological conditions.

However, the thymus as a whole never looks like a lymphoid organ, though some of the individual cells do so appear. Its function is evidently different from lymphoid organs and as Hart[30] points out, in many systemic diseases that involve lymphoid tissue, the thymus does not become involved.

The other view of the origin of these parenchymic cells is that they develop from the cells forming the reticulum (Pappenheimer,[31] Prenant,[32] Stohr[33]). Bell[34] has described transition forms between the reticulum cells and thymic cells. In

*Read before the annual meeting of the Minnesota State Medical Association, Minneapolis, April, 1925.

additional support of this view, there is no authoritative description of the invasion of lymphocytes; also the cells are present in the thymus very early (Ewing[29]).

Because of the difficulty in understanding the origin of these parenchymic cells, the tumors that have arisen from them have been variously named. If these cells are lymphocytes, then the terms lymphosarcoma and sarcoma and small round-cell sarcoma are permissible. On the other hand, as Simmonds[4] first pointed out, if they are epithelial in origin, they cannot be sarcomas and must be called carcinomas or epitheliomas.

Granting the epithelial origin of the tumors arising from the so-called lymph cells, the term epithelioma for them would be objectionable, because morphologically they appear like sarcomas. Adami[35] points out that it is obvious the terms carcinoma and sarcoma must be given a purely morphological significance. Moreover, there is a group of tumors arising from the reticulum. This tumor is distinctly an epithelioma, morphologically. Six authoritative cases of this tumor have been reported (Symmers and Vance,[17] Foot and Harrington,[22] Jacobson[20]). The concept of this tumor has a sound embryological basis (Jacobson[20]).

The term thymoma for tumors of the thymus was first suggested by Grandhomme in 1910 (Crotti[36]). This word has the advantage of being accurate whether the cells are derived from the endoderm or mesoderm. It also clearly associates the tumor with its place of origin. Non-malignant tumors are also included in this term (Bell[13]). To distinguish the distinctly different tumors arising in the thymus a word descriptive of the morphological type should be added: sarcomatous thymomas for those arising from the parenchyma and resembling small round-cell sarcoma, and carcinomatous thymomas for those arising from the reticulum and resembling epitheliomas.

Eiology.—The sarcomatous thymomas outnumber the carcinomatous thymomas by a considerable margin. The literature would indicate that there are about ten of the former to one of the latter. The carcinomatous thymomas all have occurred in patients over fifty, while the sarcomatous thymomas usually appear in individuals under thirty-five years of age. Many of them have occurred in children.

Symptoms.—The first symptom of a thymic tumor is usually cough. Early, too, there is difficulty in breathing. These two symptoms being pronounced in tuberculosis, many cases have been so diagnosed at the onset of the illness. Janeway[16] reports three such cases that later he treated with radium for thymic tumors. The differential diagnosis is absence of physical signs in the apices and increased dullness under the sternum. The dyspnea may be marked, in which case it is relatively easy to diagnose the tumor. In some cases there is difficulty in swallowing and sense of pressure in the mediastinal space. The course of the sarcomatous thymomas may be rapid, death occurring from one to four months after onset of the first symptoms. The carcinomatous thymomas, on the other hand, are more slow in developing. As the disease progresses, the dyspnea becomes extreme, the tumor infiltrates into lungs and pleura and the vessels become compressed, causing venous congestion and cyanosis of the head and neck.

Frequently there are metastases into the cervical lymph nodes on one or both sides. In some cases axillary lymph nodes have been involved. There may be metastases in the liver and kidney, but these are seldom so extensive as to be important factors in the case. It is rare that extensive metastases occur, and in no case previously have metastases in the skin been reported. For that reason the report of the following case is important:

REPORT OF CASE

H. O., aged 28, married, an elevator operator, was first seen in the Out-Patient Department November 10, 1921, complaining of cough and sore throat. At that time the physical examination was essentially negative. By November 27 there was slight swelling of the cervical glands on the left side of the neck. The patient was weak, however, out of proportion to his physical findings. He was brought to the hospital November 30 in great distress. The leading symptoms were difficulty in breathing, difficulty in swallowing, nausea, and profuse sweating. The patient had pain in his knees and ankles. He could not sleep and complained of being restless.

Physical examination revealed slightly labored breathing and slight cyanosis. He kept up continued purposeless movements of his extremities. On the left side of his neck the glands were enlarged and confluent. The skin over the glands was slightly reddened. They were tender to the touch. There was bronchovesicular breath sounds and moist râles at both bases posteriorly. A friction rub was present.

Blood cultures were negative, Wassermann was negative. His white count was 11,400 with 80 per cent polymorpho-

nuclear. Urine showed slight amount of albumin present. The patient's temperature in the afternoons was between 101 and 104.

X-ray examination of the patient's chest on December 2 did not reveal anything that would cause the symptoms.

On December 7 there appeared a small rose-colored eruption on the abdomen. These were macular and cleared on pressure.

On December 10 his sputum was blood streaked. His respiration rate was increased and there was precordial pain. The patient was delirious, large doses of morphine being required to induce sleep. The skin eruption had spread over the entire body, being present even on the palms and soles. They had a shot-like feel and were closely spaced, but were not confluent. A diagnosis of smallpox was made. As the lung symptoms were so pronounced, it was thought this was a case of visceral smallpox. An *x*-ray examination revealed numerous small areas of diminished illumination. The lung picture was similar to the one seen in miliary tuberculosis.

From this time on the patient became gradually worse. Delirium increased and the patient was boisterous until the last few hours.

Dr. E. T. Bell, of the Department of Pathology of the University of Minnesota, performed the necropsy on this patient and rendered the following report: To him the diagnosis in this case is to be credited.

NECROPSY

"The body is well developed, poorly nourished, length 183 cm., estimated weight 150 lbs. . . . There is an eruption over the greater part of the body; a few lesions on the soles of the feet—and on the left palm; the eruption is most abundant on the upper lateral anterior portions of the chest, forehead and chin; there are a few lesions on the hairy scalp and they are scattered over the entire posterior aspect of the trunk; a few on the extremities. Most of the lesions are discrete and of the macular type. A number are pustules, which, however, seem to be in the stage of desiccation for the most part. Vaccination scar on the left forearm. . . .

"There are numerous soft adhesions over both lungs. The pericardial cavity contains no excess fluid; no adhesions. . . . There is no disease of the valves or of the mural endocardium.

Both lungs are expanded and very heavy. The right weighs 1,350 grams. Crepitation is greatly reduced everywhere, especially in the posterior portions. There are large numbers of small nodules distributed throughout the entire substance of the lungs. These are seen under the pleura as well as over the cut surfaces. The nodules vary in size from a pinpoint to 6 or 8 mm. in diameter; they are firm, of whitish appearance and rather sharply outlined. The lung tissue between the nodules contains air and abundant fluid. No caseous areas are found. There is no pus except in one small bronchus near the hilus. The left lung weighs 1,200 grams and resembles the right in all respects except that the nodules are not quite so numerous. The bronchial lymph nodes are enlarged and softened. No caseous areas or calcified areas are found.

"The thymus, or a mass in the position of the thymus, is enlarged and very firm; measures 10 cm. vertically and 6 cm. transversely. Section of this structure shows soft whitish tissue, a part of which has a lobular arrangement. No caseous areas. . . .

"The left cervical lymph nodes are greatly enlarged and partly fused together. A mass of these is dissected out. The nodes are softened. Caseous areas found in one node, measuring about 1 cm. in diameter. Other nodes show no caseation or calcified areas. . . .

"Microscopic examination: Cervical lymph nodes enlarged and almost completely replaced by sarcomatous tissue; extensive central necrosis in the nodes. Lung: Metastases of sarcomatous thymoma; some nodules surrounded by inflammatory exudate; some nodules of a pure bronchopneumonia. Thymus: Thymoma of lymphosarcoma type (numerous mitoses). Liver: Metastatic sarcomatous thymoma. Bronchial lymph node: Metastatic sarcomatous thymoma. Kidney: Metastatic sarcomatous thymoma. Lungs and Skin: Numerous metastatic sarcomatous thymomas.

"Diagnosis: Sarcomatous thymoma with numerous metastases in lungs and skin and metastases in left cervical lymph nodes, liver and kidney."

SUMMARY

(a) A case of thymoma is presented with clinical, roentgen ray and pathological reports.

(b) Extensive lung and skin metastases may occur in a case of thymoma.

(c) The term sarcomatous thymoma is preferable to the term lymphosarcoma of the thymus, because:

1. These tumors do not exactly resemble true lymphosarcomas morphologically.
2. The term is equally applicable whether the parenchyma is of epithelial or lymphoid origin.

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DISCUSSION

Dr. Moses Barron, Minneapolis: I believe that most of us can say that of all the organs in the body we have forgotten least about the thymus than of any other organ. The reason for this is self-evident: We had very little to forget. The confusion as to the function and pathology of this organ is so great that practically no one can say definitely just what its purpose is or to what pathological changes or tumors it may give origin.

It has been found by animal experimentation that the thymus can be removed with very little damage to the animal, and that the results of the experimental extirpation are quite negative. Many cases of Basedow's disease show an enlargement of the thymus that is quite considerable and in about 75 per cent of cases such enlargement is present. There is a condition present in a certain group of individuals which is characterized by general lymphocytic hyperplasia, by hypoplasia of the adrenals and the aorta, and certain other anomalies in the body. This condition is known as status thymico-lymphaticus. The thymus is generally found enlarged in these individuals. Just what the relation is between the thymus and the lymphatic tissue of the body is not very well understood. In a condition known as myasthenia gravis the thymus presents an enlargement in about 90 per cent of the cases, at times being a large bulky mass. The enlargement is considered a simple hyperplasia. There are no authentic cases in which malignant tumors of the organ are associated with this condition.

The nomenclature of thymic tumors is not satisfactory and there is a great deal of disagreement about it. Ewing believes that thymoma would best explain such a tumor. Aschoff, on the other hand, disagrees with him, since the tumor does not reproduce all the elements of the original thymus. A very few of the tumors have shown structures which can be identified as the epithelial elements known as Hassal's corpuscles. Of the two types of cellular elements present in the organ the origin of one of them, the lymphocytes, has caused a great deal of controversy. Some good authorities trace their origin to epithelial cells, while another group has demonstrated an early invasion of migrating lymphocytes into the stroma of the gland. The confusion as to the true origin of the elements of this organ explains the difficulty of determining the origin of the tumors to which it may give rise.

The principal tumor of the thymus structurally resembles Hodgkin's disease, though it is most frequently designated as lymphosarcoma. This type responds readily to roentgen-ray therapy in most cases, while some cases proceed rapidly to a fatal termination. The less malignant forms, such as the simple hyperplasia associated with status thymico-lymphaticus, would also respond well to roentgen-ray treatment.

Fortunately, tumors of the thymus are rare. This is evidenced by the fact that in the Department of Pathology at the University of Minnesota only three cases have been found in over 6,000 autopsies. The case reported this afternoon is the second case showing a malignant tumor of the thymus, and the third case is that reported by Dr. E. T. Bell in a case of myasthenia gravis.

One might go on with this story hour after hour, each chapter more absurd than the other, and yet each of these healers, or systems of healing, has attained therapeutic results with certain patients who have gone from physician to physician without obtaining relief. The "cure" may have come from one believed to have a commission from on high, it may have been poor whiskey with a bitter taste, a punch in a perfectly good vertebra by an ex-sewing-machine agent, a harmless electricless belt, the printer's ink taken with a bottle of swamp-root; it may have been any hook on which to hang a therapeutic hope; but, it may have cured. There is no denying this, for it is true. "Cures" of these types have been working successfully since earliest history. We may laugh at the absurdities recorded; but, human nature does not change, and our present age does not lag behind in its tendency to be cured by anything and everything that changes the patient's mental attitude toward himself and his ills. People healed in these manners are not limited to any strata in life. They include the rich and the poor, the ignorant and educated; in fact, it is usually the educated mind that is most suggestible. Remember children, half-wits and idiots are never cured in this manner; in fact, the quack has learned to waste no time on them. On the other hand, school teachers, clergymen and college professors are often easy prey, and Walsh names in addition the "high-brows" and defines them as those with more education than intelligence.—Rock Sleyster, Wis. Med. Jour., Dec., 1924.

THE MANAGEMENT OF CASES OF COLLOID GOITER*

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I shall limit myself here to a few considerations in the management of diffuse colloid goiter. In the literature one finds such terms as simple, adolescent, sporadic, endemic and epidemic goiter. In many cases, unfortunately, the pathologic descriptions are vague or entirely lacking, and it is probable that goiters thus classified are diffuse colloid, adenomatous, or combinations of both.

The secreting portion of the thyroid gland is composed of vesicles or acini, the lining of which consists of cuboidal or low columnar epithelium. These vesicles contain, more or less, a deeply staining colloid material and are supported by tissues common to gland structure.

At certain times the thyroid gland is called on to produce an increased amount of its product, thyroxin. This usually occurs during metabolic stress, associated with adolescence, pregnancy and lactation, when, owing to a lack of available iodin in the thyroid gland, there may be a decreased amount of thyroxin available in the tissues; this results in a state of potential or actual hypothyroidism. During these times the thyroid is under stimulation, the blood supply is increased greatly, and an abnormal deposit or storage of colloid material takes place. The foregoing, reduced to its simplest terms, is the mechanism in the formation of diffuse colloid goiter. Plummer's concept of the sequence of events given more in detail is as follows: "An inadequate supply of iodin for the proper functioning of the thyroid, a subnormal delivery of thyroxin to the tissues, a potential or actual hypothyroidism, elevation in intensity and sustenance of thyroid stimulation, diffuse hypertrophy of the thyroid, and, if stimulation is sustained sufficiently long, fatigue of the vesicles, change in the secretory process, disappearance of the diffuse hypertrophy, storage of colloid in excess of the normal amount, diffuse colloid goiter." Also, "The sustained stimulation of the thyroid causing a diffuse hypertrophy or the storage of an abnormal amount of colloid causes the formation of new tissue, adenomatous goiter." Just how much colloid may be considered normal or abnormal is not definitely known, although storage to the extent of making the thyroid gland easily palpable may be considered abnormal. Overdistension of the alveoli with colloid may cause the epithelial cells to become cuboidal or flat, and in some cases disappear altogether.

The etiology of diffuse colloid goiter has interested medical men for many centuries. Numerous and varied theories as to its cause have been advanced only to be discarded as knowledge of the subject has increased. McCarrison's exhaustive studies on the causation of goiter in the Himalayas, as well as the experiments of Marine and Lenhart, working in the fish hatcheries, would lead us to believe that bacteria play an important part in the etiology. McCarrison concludes that the cause of endemic goiter is a bacterium residing in the intestinal tract of man, and that in some way a toxin is liberated which causes the thyroid to hypertrophy. More recently, however, McCarrison has modified his theories somewhat, and adds to the theory of infection other factors such as: lack of exercise, overcrowding, inappropriate food, and imperfect hygiene.

Marine and Kimball have quite conclusively shown that colloid goiter, and probably adenomatous goiter as well, may be prevented in most cases by the appropriate administration of iodin. Marine has shown that, in normal thyroids, the iodin content varied between 5.5 mg. and 1 mg. for each gram of dried gland, and that where the iodin store was found below 0.1 per cent, hypertrophic changes were the rule. Comparing further the varying degrees of thyroid hyperplasia with the iodin store of such glands, it was found that the iodin store progressively decreased as the degree of hyperplasia increased. Thus in cases of most marked hyperplasia, iodin was absent or present only in traces. Plummer has suggested that lack of iodin and infection may coexist, as the bacterial flora in some way robs the organism of the small amount of iodin contained in food that would otherwise be available to the thyroid for the elaboration of thyroxin. In short, it may be said without further discussion of the predisposing etiologic factors, that in whatever manner deficiency of iodin is brought about, whether by insufficient intake, inadequate assimilation or utilization, it is the chief known cause of the formation of diffuse colloid goiter.

*Read before the Southern Minnesota Medical Association, Owatonna, Minn., May 18, 1925.

Diffuse colloid goiter is found the world over. In some localities, as for example in the mountains of Switzerland and in the Himalayas, it is very prevalent. In general, it is more commonly found in the mountainous regions and inland as compared with the seacoast. In the United States, as is well known, it is found more commonly in the northwest states, in the region of the Great Lakes, and in the valley of the upper Mississippi.

In the United States, a large percentage of diffuse colloid goiters appears between the sixteenth and twentieth years; there is a tendency for the goiter to disappear by the twenty-fifth year, only to reappear during the childbearing periods.

On examining a patient with diffuse colloid goiter, a diffuse, symmetric enlargement of both lobes and the isthmus of the thyroid gland is noted. This enlargement may be barely perceptible, or so large as to be very disfiguring, or by its encroachment on the trachea may cause pressure. Bruits and thrills are often present due to increased blood supply. Often, too, on examination, scattered firm nodules are palpated, which probably indicate the presence of adenomas. The latter may never disappear entirely, although they may vary greatly in size, due to the fluctuation in the quantity of colloid which they contain.

A properly conducted examination is important. In order to palpate the thyroid gland, it is feasible to stand directly in front of the patient, grasp the right lobe with the left hand, the thumb in front, and allow the fingers to sink in from behind the sternocleidomastoid muscle. Pressure may be made with the opposite hand pushing the gland and trachea toward the side palpated. In this manner, the transverse diameter is estimated, and, by instructing the patient to swallow, the gland may frequently be lifted out of the thoracic strait far enough to determine its exact length.

Patients with diffuse colloid goiter do not have symptoms of hyperthyroidism. On the other hand, they have symptoms indicating a mild degree of hypothyroidism, such as dry skin, lack of energy, and decreased tolerance for cold. The basal metabolism is usually normal or below normal. In 329 tests of the basal metabolism made on patients with diffuse colloid goiter at the Mayo Clinic, it was normal or below normal in 87 per cent. Neurotic patients whose attention has been directed to the thyroid by frequent examinations may complain of nervousness, rapid heart, feeling of weakness and lack of strength. That these symptoms are not due to hyperthyroidism may be determined by the finding of a repeatedly normal or subnormal basal metabolic rate.

The differential diagnosis of adenomatous, exophthalmic, and diffuse colloid goiter is important, but should not be difficult. The diagnosis of diffuse colloid goiter and adenomatous goiter is usually readily made by palpation. However, adenomas deeply imbedded in the gland are not always easily palpated, especially if the gland is extremely vascular, and not until the thyroid is reduced in size, either spontaneously or by treatment, can they be ruled out with certainty.

Nervousness, tachycardia, palpitation, weakness, loss of weight, increased appetite, moist hyperemic skin, tremor, increased heat intolerance, and frequently exophthalmos, are the cardinal symptoms and signs of exophthalmic goiter. These factors, taken in conjunction with a persistently increased basal metabolic rate, should be sufficient to lead one to distinguish between the exophthalmic and the diffuse colloid goiter.

That endemic goiter, which includes colloid goiter, adenomatous goiter, and combinations of both types, may, to a large extent, be prevented in man and animals by the oral administration of iodin has been quite definitely proved. This fact is one of the important discoveries of the last decade. Diffuse colloid goiter without adenomas with lateral lobes more than 6 cm. in diameter are relatively rare in the United States; furthermore, adenomas once developed probably never disappear entirely. We know that an adenomatous thyroid not infrequently becomes hyperfunctioning, and, too, that occasionally the administration of iodin to patients with adenomas will initiate hyperthyroidism. Hyperfunction once initiated by the administration of an excess of iodin will continue for years, even though the iodin is discontinued. This factor should be seriously considered in the treatment with iodin of diffuse colloid goiters containing adenomas. Adenomatous goiter frequently becomes a surgical condition.

Iodin in small doses should be given to all individuals during early childhood and adolescence. At what age it should be started and at what age discontinued cannot as yet be definitely stated. It should also be given during the latter months of pregnancy and during lactation. Two grams (30 grains) of sodium iodid may be given in divided

doses over a period of two weeks, this amount to be repeated semi-annually. However, it is preferable to give smaller doses of iodin at weekly intervals throughout the greater portion of each year. A satisfactory, palatable, proprietary product, known as "iodostarin," is on the market. The preparation is in tablet form and contains 10 mg. of sodium iodid; one tablet may be given each week during the school year. Within the last few years many cities have initiated the practice of iodizing the water supply by adding one part of sodium iodid to 100,000,000 parts of water. Several brands of iodized table salt are on the market. These usually contain one part of iodin in 5,000 parts of sodium chlorid. Whether or not the person will receive enough iodin to prevent endemic goiter or whether there is enough iodin in the water and salt so treated to initiate hyperthyroidism in persons having adenomatous goiter has not as yet been determined.

Iodin has long been a standard remedy in the treatment of diffuse colloid goiter. However, for several years at the Mayo Clinic the use of thyroxin intravenously, or of desiccated thyroid orally, has largely supplanted iodin in the treatment of this type of goiter. If a patient with diffuse colloid goiter is given from 5 to 10 mg. of thyroxin intravenously, or its equivalent in desiccated thyroid orally, and it is absorbed, the bruits and thrills will disappear in a few hours. During the first twenty-four hours the gland shrinks perceptibly, and if extremely vascular may be reduced as much as one-third in volume. In moderately large goiters most of the colloid may be absorbed in from one to two weeks, and some of the very largest disappear in from three to twelve weeks. It is frequently impossible to reduce them to normal size.

At the beginning of treatment the patient's metabolic rate must be accurately determined. If the rate is below normal, it must be brought to normal or slightly above and maintained there by the daily administration, orally, of desiccated thyroid; if it is not continued after the initial dosage the vascular phenomena may reappear, and the thyroid gland will once more increase in size. The length of time desiccated thyroid should be continued depends somewhat on the results of the treatment. If the gland is materially reduced in size, desiccated thyroid is given for a few weeks longer, and then a small dose of iodin is given. If after a few months there should again be a tendency to enlargement, the treatment may be repeated.

Largely on account of the expense incurred in repeated basal metabolic rate estimations, the routine treatment of small colloid goiters with desiccated thyroid is not recommended. Iodin may be used in these cases, and it may also be tried in cases of large colloid goiters in which the determination of basal metabolic rates is impracticable or impossible.

There are many practical problems in the treatment of patients having diffuse colloid goiter. Desiccated thyroid orally has been administered almost exclusively in the Mayo Clinic. After the patient's true basal metabolic rate has been accurately determined, relatively large doses are given daily for three or four days. This usually amounts to from 6 to 10 grains if the metabolic rate is somewhat below normal; if normal, somewhat smaller doses are given. At the end of a few days basal metabolic tests are again made and the dosage regulated from time to time so that the patient's rate is maintained at or slightly above normal. Patients vary considerably in the amounts of desiccated thyroid needed to bring about a normal metabolic rate; as a result, frequent observations and tests are necessary. It should be emphasized that the results sometimes obtained in the treatment of diffuse colloid goiter, with either iodin of desiccated thyroid, are disappointing. On the other hand, the results are very gratifying in most cases. From an economic point of view the time required and expense incurred in the treatment are considerable. However, the early treatment of colloid goiter may sometimes prevent the formation of adenomatous tissue, and in this way save the patient from a thyroidectomy later, and even though the gland is not materially reduced in size, treatment tends to prevent further enlargement.

Operation in cases of diffuse colloid goiter is rarely, if ever, indicated. There is no hyperthyroidism and the goiters often disappear spontaneously in the third decade or earlier if treated with iodin or desiccated thyroid. In certain cases, especially if the goiters contain large adenomas, operation must be resorted to, but it should be delayed until after the patient's twenty-fifth or thirtieth year.

CONCLUSIONS

1. Endemic goiter, of which colloid goiter is one form, is caused by a lack of available iodin in the thyroid gland.

2. Endemic goiter can be prevented largely by the oral administration of iodin.

3. Prevention or early treatment is exceedingly important.

4. Satisfactory results may be secured from the treatment of diffuse colloid goiter.

5. Iodin may be used in the treatment, but desiccated thyroid is more satisfactory.

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DISCUSSION

Dr. O. J. Hagen: The story of the thyroid forms a thrilling chapter in the history of medicine. The essayist has given, in the brief time allotted him, a clear and illuminating résumé on the management of the colloid goiter. I have read his paper and listened to its reading here with much profit and satisfaction. In the few minutes given me to discuss it, I can only touch upon a few points and give expression to a few thoughts the paper has evoked in my mind.

I said thrilling chapter. In all the study of science and discovery, one is fascinated by the personal element that enters into the picture. Who can read of the wonderful story of the discovery of radium and forget the heroic patience of the Curies—or that of immunology and not thrill over the marvelous insight of Pasteur—or the discovery of America and not admire the man who watched the weeks through and cheer him when the supreme moment came in sighting land.

As I look back and read the evolution of the knowledge of the thyroid gland, I am reminded of the day when the treatment of those afflicted with goiter was not so effective as it is today.

Long ago the "King's touch" was a treatment, certain kinds of stones were carried near the throat, sea weeds were piled on the tumor; the hands of the dead were laid upon it; lizards enclosed in bags were hung around the neck.

Not long ago science took a handful of sand and constructed a lens and now the microscope pierces the veil and brings the unseen into the plane of the seen—science became hundred-eyed in the forms of chemistry, physics, biochemistry, pathology, histology. Then Kocher, Revirden, Charles Mayo, Crile, Trousseau lent their learning and observational powers to the subject and data began to accumulate on the function of the thyroid. Then came Louis Wilson, Marine, Kimball, Crotti, MacKinley and Boothby with their pathological summaries and laboratory investigations. Then Southern Minnesota entered into the scene, and Kendall, at whose command were placed the resources of all the equipment for study that money could buy and tons of thyroid tissue from the stockyards of Chicago—at whose disposal was placed that which money cannot buy—an enthusiastic, intelligent and sympathetic co-operation—this Kendall, this slave and apostle of science, driven by high purposes and deep resolves, gave his erudition and genius to the task—and emerges out of his laboratory after months and months of painstaking experimentation, with the mystery of the thyroxin molecule in his hand.

Then we see the scientist-philosopher, Henry Plummer—biggest of them all—going up the mountain, bringing down a pentalogue of principles and hurling them at the profession, saying: "1. Thyroxin is active directly or indirectly in the cells throughout the tissues of the body. 2. Thyroxin is an agent hastening the rate of formation of a quantum of potential energy available for transformation on excitation of the cell. 3. Hyperthyroidism is the physiological status of an individual otherwise normal when the thyroxin in the tissues is sufficient to hold the basal metabolism above normal. 4. Hypothyroidism is the opposite of hyperthyroidism. 5. All the phenomena of pure hyperthyroidism are those that must attend a sustained elevation of the basal metabolism."

So much for the personal side of the discussion. Now the important points to be re-emphasized are:

1. That it is largely a preventable disease and it is a blot on our escutcheon that we have colloid goiter at all.

2. We must know how to diagnose, not only the frank case, but the so-called complicated cases. Remember that by *x*-ray or by operation you can make a fairly compensating colloid goiter a myxedematous goiter. Sometimes the desiccated thyroid extract may not be absorbed in the intestinal tract. Then, try thyroxin.

3. We must not call the puberty hyperplasia or the colloid with bruit an exophthalmic goiter. Nor must we submit the girl who comes with a colloid, complicated with neurocirculatory asthenia, to an operation. There is a warning sent out by Dr. Foss in the last Journal of Surgery, Gynecology and Obstetrics condemning the profession because of the number of operations performed on colloid goiters, which should be treated medically.

4. Remember, a neurocirculatory asthenia is a syndrome with a normal basal rate. Do not make a decision on a single rate or on a single examination. We must not make a decision of such moment to the patient, based on short-cut determination machines manned or womaned by short-cut trained technicians.

After you are sure you have a colloid goiter, *in a patient under 20*, the treatment is iodin and thyroxin or thyroid tablets, sufficient to keep the metabolic rate normal or slightly above.

ABRUPTIO PLACENTÆ*

A BRIEF REVIEW WITH REPORT OF CASE

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Abruptio placentæ means a forcible premature separation of the placenta from its normal site, the fundus uteri, and usually takes place near term. It is associated with premature and still birth, and occurs as a menace to the mother about one-half as often as placenta previa—about once in 500 cases, according to Adair.

Etiology.—Considered from an etiological standpoint, DeLee believes that there are three general groups of causes:

1. Pregnancy toxemia and nephritis.
2. Diseases of endometrium and ovum.
3. Traumatism.

The last group, though small, is usually associated with one of the others. The first and second groups may be closely related.

Previous toxemia is a predisposing, if not a causative, factor.

The majority of opinions favor the belief that the ovum is the source of the toxins.

Willson, DeLee and others believe that abruptio placentæ is caused by the inundation of the uterine wall with a toxin of the nature of a hemorrhagin, liberated from the placenta, and naturally producing its maximum effect at the site of its absorption and greatest concentration.

Pathology.—The uterine muscle is degenerated and infiltrated with blood. There are many petechiæ under the peritoneum, some of which are ruptured. The muscle cells are torn apart in places by infiltrations of blood; endarteritic and degenerative changes with thrombosis are present in the blood vessels. These findings are more marked in the area of placental attachment, and account for postpartum uterine atony. The placenta also shows evidence of endarteritis, and may show the evidences of several hemorrhages, of red infarcts of varying dates, or it may be torn or compressed by the clots, according to DeLee.

Holmes says: "The symptom complex of eclampsia is markedly different from that of a toxemic apoplexy. So far as we now know, the pathological findings in the liver alone show very many characteristic differences. The coincident attack of eclampsia and toxemic abruptio placentæ strongly suggests that two intense poisons are liberated, producing diverse symptoms."

The mechanism of separation is described by DeLee as follows: The bleeding usually occurs in the center of the placental implantation, where the separation first occurs. The blood escaping under the decidua basalis may pursue four directions.

First, and most rarely, it may bulge out the uterine wall toward the abdominal cavity, and bulge into the cavity of the ovum, the edges of the placenta remaining attached to the uterus.

Second, it may dissect up the membranes all the way round, severing almost all the connections of the ovum.

Third, it may break into the liquor amnii.

And, finally, it may seek a direct passage outward from the edge of the placenta, under the membranes, through the cervix and into the vagina. The first three varieties are called "concealed hemorrhage," but in all cases the exit of the blood may be blocked by the head, or the membranes, or a firm clot plugging the cervix. The uterus may be immensely distended by the blood. A fatal intrauterine hemorrhage may occur without a drop of blood showing externally.

The bleeding is usually first internal or concealed, and then combined external and internal, the former being merely the precursor of the latter. The mildest case and most common is the purely external hemorrhage.

Symptoms.—Acute abdominal pain usually referred to one side of the uterus, often accompanied by fetal movements and often followed by increasing backache, sudden increase in the size of the uterus, with tension of the abdominal wall, absence of fetal heart tones, a uterus of board-like consistency or soft and atonic, with the general symptoms of increasing anemia and shock, and soon external hemorrhage, constitute the foundation for a direct diagnosis.

Any of these symptoms in a woman of advanced pregnancy should arouse the strongest suspicion of a possible premature detachment.

*Read before the Southern Minnesota Medical Association, Owatonna, Minn., May 18, 1925.

Differential Diagnosis.—DeLee says: "In differential diagnosis, placenta previa, rupture of uterus and extrauterine pregnancy most frequently come up, but on rare occasions one may have to eliminate other non-obstetric accidents, as gallstone colic, rupture of an appendix or gallbladder and intra-abdominal injuries."

Prognosis.—As to prognosis, DeLee says: "The accident is one of the gravest with which the obstetrician has to deal, and it is safe to say that one-half of the women and 95 per cent of the babies in complete detachment with concealed hemorrhage will die, while a large proportion will be saved with partial detachment and under skillful treatment."

Treatment.—The method of treatment depends upon whether the cervix is or is not dilated, and whether the case is mild or serious.

Expectant treatment, including rupture of the membranes, maintenance of external pressure, observation of fetal heart tones, etc., may be resorted to in very mild cases. If the condition continues to progress, the case becomes serious.

Serious cases require prompt diagnosis and treatment. The best treatment is that which empties the uterus quickly, and with the least danger to the mother and fetus, if the fetus is alive.

Early, rapid and complete emptying of the uterus, through the parturient canal, should be attempted at once if conditions favor the method, but, if not, a cesarean section should be performed, with or without removal of the uterus. The dangers are not past after delivery. Postpartum hemorrhage is frequent, both from uterine atony and because of the hemophilic nature of the disease. DeLee says: "If the hemorrhage does not immediately cease upon the removal of the placenta, if the uterus remains flabby and does not at once contract under the influence of ergot and pituitrin, the latter injected into its substance, and if there has been previously much manipulation, supravaginal amputation of the uterus should be done."

CASE REPORT

Mrs. C. K., aged 39, multipara, at full term, had had one three months abortion, followed by six normal labors. She had never been under a doctor's care, except during labor. She had complained of backache since one month pregnant. She had had a severe attack of pain in the right lower abdomen when one month pregnant, with recovery in a few days. She had had a severe pain in the left abdomen eleven days previously and called her husband home from work, but when he came she felt better, and helped with the family wash. She had had a sharp pain in the left lower abdomen at 5 a. m., and I saw her at 11:30 a. m., April 3, 1925. She believed she had felt life at 5 a. m., but not since. She complained of severe backache, nausea, faintness and weakness, which had become much worse since 8 a. m.

She appeared very anemic. The pulse was about 85 and weak. Blood pressure was 85 systolic, 50 diastolic. The uterus was distended, very hard and almost spherical. The fetus could not be felt and fetal heart tones could not be heard. The cervix admitted two fingers, and was firm, and the presenting head could be felt. The membranes were intact. There was no external hemorrhage. About one hour later, there was some blood-stained discharge. The uterus gradually increased in size during the next hour, and at 12:30 the bag of water spontaneously ruptured and a quart or more of blood and liquor amnii came away. She continued to flow freely until the uterus was emptied in the hospital, about twenty minutes later, under light gas anesthesia. Manual dilation of the cervix was followed by version and extraction of a dead fetus. The placenta slid out immediately after delivery of the fetus. The uterus contracted fairly well, and there was no further hemorrhage. It was noted that the blood did not clot. One pint of normal saline was given intravenously, and measures used to combat the shock. The patient's condition became progressively worse, and she died within two hours of delivery.

DISCUSSION

There are several features of the case which should receive further mention. First, this was a very severe case of abruptio placenta, with concealed hemorrhage, the hemorrhage only appearing externally, after the patient was in shock from internal hemorrhage. The baby's head and intact bag of waters acted as a cervical plug, preventing external hemorrhage. Second, the etiologic factor was probably the toxemia, causing changes in the endometrium and placenta. There was no history of associated trauma. There were no pre-eclamptic symptoms. The absence of blood clotting suggested toxemia. Third, the uterus in the case was board-like, in contrast to the atonic type of uterus, which may have been due to the fact that it was under tension from the concealed hemorrhage.

My impression is that the mortality of abruptio placentæ is much too high, and can be materially lowered as follows:

First, by prevention of the causative factors by closer observation and study of all pregnant women, and all cases of abruptio placentæ, including pathological study of the tissues involved, where possible.

Second, by more prompt and radical treatment, including cesarean section and supravaginal hys-

terectomy, especially in cases which appear to be progressing. With cesarean section, any degenerative changes in the uterus can be observed, and its failure to contract, after ergot and pituitrin, can be seen, eliminating doubt as to whether a hysterectomy should or should not be done. Hysterectomy eliminates postpartum hemorrhage, due to atony of the uterus, which is a too frequent cause of death.

Third, by prompt use of blood transfusion and methods to relieve anemia and shock after delivery, as many of the deaths occur in the first few hours after delivery.

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RECENT ADVANCES IN THE TREATMENT OF SYPHILIS*

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The constant introduction of new remedial agents in the treatment of syphilis is good evidence that arsphenamin alone does not meet all requirements. In fact, experience with some of the recent methods proves beyond a doubt that satisfactory therapeutic results can still be obtained when the spirocheticidal effect of arsphenamin fails. The essence of this observation is that we must still trust to a large extent to the immunity mechanism of the tissues and blood. On the other hand, it must be admitted that arsphenamin is still supreme as a spirocheticide and cannot at present be ignored in any scheme of treatment, no matter what form the syphilis may assume.

It is, of course, impossible to discuss all the remedies that have been suggested from time to time, even during the last few years. Some of them have more fancied than real value, others may in time prove to be real additions to our armamentarium. I shall confine myself to the consideration of such measures as have had a reasonably wide application and seem to fill a want not supplied by the more standard drugs.

Before discussing in detail the treatment of a syphilitic infection, I should like to call attention briefly to the advanced methods of our state boards of health in preventing the spread of the disease, and thus saving the nation an incalculable amount of money, physical pain, and mental anguish. We are all too prone, as physicians, in our desire to obtain brilliant results from treatment, to overlook the value of preventive measures. A thorough understanding of the disease has done much, however, to help in preventing its indiscriminate spreading, and we are not doing our duty when we do not take advantage of our opportunities. It is not difficult to visualize the untold misery that one infected ignorant female may cause, not only through immediate contact, but also to virtuous women and as yet unborn babes. The proper control of one such individual is worth all the expenditure of energy, time, and money that we may put into it.

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In discussing the purely remedial procedures of more recent date, I shall confine myself to the consideration of (1) bismuth; (2) sulpharsphenamin; (3) tryparsamid, and (4) malaria.

Bismuth.—The bismuth preparations were first enthusiastically used in France. They seem never to have acquired an equal popularity in the remainder of Europe or America. On account of its toxicity, bismuth has never been used extensively for syphilis until recently, although it has been used considerably in the treatment of certain affections of the skin, ulcer of the stomach, sinuses, and in roentgenographic studies of the gastro-intestinal tract. It cannot be said even that its use in the treatment of syphilis is at all new. Timid attempts have been made with it just as with gold and silver and other heavy metals. A definite advance was made when, by chemical combinations with other basic elements, it was rendered decidedly less toxic. The large number of combinations, each usually parading under some trade-name, is astounding. Each preparation is stated to have special virtues and almost every country seems to take pride in producing combinations of its own. It stands to reason that all the various combinations are not of equal value. In the United States about a half dozen bismuth preparations are in common use. About two months ago the Journal of the American Medical Association published a study of these preparations by the Council of Pharmacy. This analysis proves that it is not a matter of indifference which preparation the practitioner chooses.

In my own work, I have used sodium potassium bismuth tartrate practically exclusively. Judging by the reports in the literature on other bismuth preparations, I feel that it has been as efficacious as we have any right to demand. I give this preparation, 0.2 gm. to the dose, intramuscularly, at intervals of from three to seven days, the average being five days. If well tolerated, twenty doses are given consecutively in each course.

It is a fact that bismuth is an energetic spirocheticide. This has been proved over and over again by observation of its effect on the early lesions, such as the chancre, the mucous patch, and the condyloma latum when teeming with treponemas. Bismuth alone will remove demonstrable organisms from these lesions in twenty-four hours. This in itself, while it is decidedly slower than the action of arsphenamin, should entitle the drug to a welcome, since it allows a third choice when the patient is hypersensitive to mercury and the arsphenamins. It is as yet too early to say whether bismuth produces any lasting effect, nor has it been determined which bismuth combination has the highest therapeutic effect with the lowest relative toxicity. It would seem that the immediate effect of bismuth is superior to that of mercury. In some chancres, the induration does not disappear by the use of bismuth alone, nor does it seem that its effect on the enlarged glands is particularly striking. On the other hand it probably affects the condyloma latum more promptly than any other drug. The effect on the secondary eruption is slower than that of arsphenamin, and it does not produce a Herxheimer reaction. The blood Wassermann reaction is not reversed as promptly as by arsphenamin, but its reversal is probably more lasting. Certain writers laud the effect of bismuth on neurosyphilis. The fact that bismuth has been repeatedly demonstrated in the spinal fluid lends support to this opinion. I have seen the *Spirocheta pallida* disappear from mucous patches after the use of bismuth, when arsphenamin had failed. All told, therefore, bismuth may be considered a remedy of no mean value. It is usually ranked as superior to mercury and inferior to arsphenamin. In view of the undoubted value of arsphenamin, we are not at present justified in employing bismuth alone in the treatment of early infections. There is, however, little objection to their combined use. Whether bismuth will prove as desirable an adjuvant to arsphenamin as mercury, must remain undecided at present.

It is the universal experience that bismuth produces very few undesirable complications. The bismuth line practically always appears in the mouth after the fourth or fifth injection. This is not an indication to stop treatment. If reasonable cleanliness and care of the mounth are maintained, it causes no special trouble. Occasionally one also sees some discoloration of the sublingual veins, a curious phenomenon but of no practical significance.

Gingivitis is occasionally seen but it subsides rapidly when bismuth is stopped. It can probably always be avoided if the mouth is kept scrupulously clean. Ulcerative stomatitis is very rarely seen and can probably also be attributed to lack of proper oral hygiene. Albuminuria occurs fairly often, but is usually not troublesome. The kidney

should receive the same consideration as when mercury is employed. Dermatitis has been described but must be exceedingly rare; I have seen no definite case of it, neither have I seen definite evidence of a cumulative effect of the drug.

Sulpharsphenamin.—Sulpharsphenamin, a sulphurous acid ester of arsphenamin, differs only slightly from neoarsphenamin. It has been used under different names, and first attained popularity in this country after Voegtlin had published his studies. He believes that this drug is less toxic, and has greater sterilizing power than neoarsphenamin and that it is as effective therapeutically. One of its chief practical advantages is that it can be given subcutaneously and intramuscularly as well as intravenously. It is as rapidly eliminated when given intramuscularly as when given intravenously. Many experienced observers believe that the intramuscular method is the most valuable. Sulpharsphenamin causes little or no local pain in most instances, and practically no other undesirable local effects. It is probably never necessary to give a larger dose than 0.4 gm. every five days. It should be put up in a 30 to 40 per cent solution. Voegtlin believes that for penetrating the nervous system it is superior to arsphenamin and comparable to tryparsamid. I have found that spirochetes disappear from a primary lesion in from seven to ten hours after its administration. The chancre heals in from seven to ten days. In early infections I have been in the habit of giving the drug in doses of 0.4 gm. every three days for the first three doses and then every five days until a total of 8 gm. have been given. After the third dose the patient begins mercury inunctions. These are continued until the second course of sulpharsphenamin is begun in about six weeks. I plan to give a total of four courses of sulpharsphenamin. Under this regimen there have been no neurorecurrences, and the therapeutic results have seemingly been excellent. I would not encourage the subcutaneous method as the drug can be as readily given intramuscularly. There is no objection to giving it intravenously, but there is no special advantage in this unless it has proved too painful intramuscularly and the patient is sensitive to the other arsphenamins. Whether in its ultimate sterilizing power it is equivalent to arsphenamin, only future experience can determine. It can, however, be confidently employed as an effective drug, in the treatment of syphilis, particularly cardiovascular syphilis, when given intramuscularly.

Dermatitis following the administration of sulpharsphenamin is a possibility, but in my experience this has caused little trouble. Probably the most serious complication is hemorrhagic purpura or even aplastic anemia. These unfortunate complications can be produced without intensive treatment. They should always be watched for, but if the drug is given in only moderate dosage they need be feared but little.

Tryparsamid.—Tryparsamid has been widely discussed in this country during the last two years. Its place in the treatment of syphilis is as yet undetermined. It is likely that the first reports were entirely too enthusiastic. There is no doubt that patients with mental symptoms suggestive of early paresis and with positive serologic findings in the blood and spinal fluid are often materially improved symptomatically. Occasionally even the findings in the spinal fluid become entirely negative. There seems to be a rather marked tendency to relapse, however, both in the clinical symptoms and the serologic findings. Tryparsamid may have some value in the treatment of cardiovascular syphilis, but it probably is no more valuable than arsphenamin. It has no value in the early stages of syphilis and is inferior to arsphenamin in latent syphilis and tertiary lesions. I am inclined to believe that it manifests its best effects in cases of neurosyphilis, when systematic treatment by the arsphenamins has been given previously. The greatest drawback to this drug is its effect on the eyes. It produces retrobulbar neuritis and thus amblyopia. It should never be given in the presence of any impairment of the optic nerve. Collaboration with a competent ophthalmologist is very desirable, and on the slightest warning, as when the patient complains of seeing flashes of light, or clouds appearing from nowhere, or of feeling that the floor is coming up toward him, the drug must be stopped at once. It is commonly administered in doses of from 1 to 3 gm. dissolved in water, once a week, until ten doses are given. Such a course is repeated after a two months' rest.

Malaria.—The treatment of syphilis by artificial malarial infection has been the outgrowth of observations and studies showing the value of utilizing the body's defense mechanism. It had long been noticed that intercurrent febrile infections had a definitely beneficial effect in general paresis. On

the assumption that the results observed were due to the febrile attacks, efforts were made to produce them by the injection of such substances as sodium nucleinate, staphylococcus and streptococcus vaccine, typhoid vaccine, and tuberculin. In 1917, Wagner von Jauregg conceived the idea of producing febrile attacks by inoculating patients with malarial organisms. This has proved so far, undoubtedly, the most valuable application of the principle.

The method is very simple, but not without its definite dangers. At the present time its use should be confined entirely to institutions.

While different methods of administration have been tried, I find it most practical to inoculate the patient with 5 c.c. of malaria-infested blood intravenously. The blood is obtained from a patient in the active stage of infection. Since no method of keeping the plasmodia in vitro for a long period has been devised as yet, it is always necessary to have an infected patient on hand. Obviously, such treatment is only practical when a considerable number of such patients are observed regularly. It is, however, possible to transport the plasmodia with proper precautions, and infections have been obtained from injections of blood twenty-four hours' old.

There is no evidence that the virulence of the organism is increased by repeated passage through human hosts. The course of the infection, however, differs markedly in different individuals, probably owing to individual resistance. It is absolutely necessary that a pure tertian strain be employed because the others are entirely too dangerous. Some of the patients, when infected, present a classical tertian course; others follow this course for a few days and then suddenly change to the quotidian type; others show the quotidian febrile curve from the start. All types of variations from this course may be observed. I usually allow the patients to have twelve paroxysms before checking the infection with quinin. It has been found that eight attacks are sufficient to produce definite therapeutic effects, and sometimes it becomes necessary to stop the attacks before the desirable dozen have been reached. The temperature often reaches 106° F., but it is a fact that the height of the temperature does not influence the therapeutic effect. Usually a certain degree of anemia is noted during the febrile course. Occasionally there is edema of the ankles, icterus, and enlargement of the spleen. It is very important that the heart be closely watched, since it probably bears the brunt of the attack.

When the required number of paroxysms have passed, there is no difficulty in stopping the fever by the administration of quinin. Usually there are no more paroxysms after the first dose of quinin, but occasionally another mild attack occurs. The quinin is then given at definite intervals for about a month. I have never seen a relapse of the paroxysms when quinin was given properly. It is always desirable to have such a preparation as quinin urethan on hand. This can be given intramuscularly and the attacks promptly averted at any moment.

The clinical response to this method of treatment has been very striking. Like all observers who have had a reasonable experience with this method of treatment, I have been able to bring about quite satisfactory remission of the syphilitic symptoms in more than 50 per cent of cases. This is really a striking contrast to the little that could be done for general paresis even a few years ago. It must be remembered that this treatment is not for patients that have been kept in institutions for a long time. Elderly and decrepit patients are excluded by the risk. It probably has no effect on juvenile paresis. Experience with this form of treatment is now extensive enough, I believe, to justify the assertion that it is one of the outstanding achievements of modern therapy.

The method has also been used in a limited number of cases of neurosyphilis without evidence of paresis. While the number of patients treated has probably been too small from which to draw conclusions, sufficient evidence has accumulated to indicate that the progress of infection can be arrested. The findings in the spinal fluid in cases of early neurosyphilis have been reversed to normal, and the fluids, persistently positive in the later stages, refractory to standard measures including even intraspinal injections, have returned to normal. Tabetic lightning pains have been much improved, and optic atrophy checked.

One of the striking features of this treatment of paresis is that the serologic improvement does not keep pace with the clinical. There is usually very little change in the spinal fluid even after there has been complete remission of symptoms. The general tendency of the fluid is, however, to return gradually to normal, sometimes after many

months or even years. The clinical improvement may be quite apparent even during the febrile period, but sometimes not for many months later. Since many patients have shown continued psychic improvement for more than a year it is well not to give up hope. The remissions are, of course, not all equally complete. Some patients become practically their normal selves, in others some stigmas are apparent to the psychiatrist but not to their lay companions; others again may take up simple occupations but retain a definite residual dementia. It is likely that the degree of improvement is determined by the amount of parenchymatous injury sustained by the brain.

The mechanism of these striking clinical results is as yet obscure. An effect purely dependent on fever can probably not be assumed. Beneficial results have been noted in patients whose temperatures have never risen to the point necessary to kill the spirochetes. The effect of leukocytosis can be ignored because leukocytosis does not appear with malaria. When leukocytosis is manifested it is the result of some complication. It has been noted, for instance, that pyogenic meningitis with marked leukocytosis did not interfere with the viability of the spirochetes in a case of paresis. To explain it as merely the effect of foreign proteins produced by the malaria, would seem especially lame, since the effects obtained from streptococcal and typhoidal vaccines were decidedly inferior. It has been suggested that the plasmodium produces antibodies that simultaneously act as immune bodies against the *spirocheta pallida*, an overlapping of the immunity as it were. At the present time it must be said that we have no satisfactory explanation of the mechanism of this therapeutic action of malaria.

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COFFEE DRINKING BY CHILDREN

Coffee drinking by children has long been regarded with disapproval by pediatricians. There are a number of objections to the practice, among which its harm to the nervous system is important. It is entirely conceivable that the use of caffein-containing beverages by the child will lead to the production of serious nervous defects later in life.

In their recent book, "Safeguarding Children's Nerves" (1924), Drs. Walsh and Foote clearly indicate that there is an increasing nervous instability of American people as demonstrated by the failure of many of our troops to withstand the stress and strain of active service. These writers believe that the numerous cases of shellshock which were suffered by many American soldiers in the World War were nothing more than cases of hysteria. It is possible that the early use of coffee has had a contributing part in causing the lack of nervous balance that is exhibited by so many adults in this country.

The drinking of coffee in the United States is steadily increasing, and the average annual consumption now amounts to thirteen pounds or more per capita. No small portion of this coffee is used by children, as shown by a study of the diet of a large number of children of preschool age at Gary, Indiana. This survey was made by the Children's Bureau of the United States Department of Labor. The report mentions that "two-thirds of the entire group were found to drink coffee habitually, and 40 per cent to have it more than once a day. Not only so, but in certain of the groups of foreign-born parentage, coffee was drunk by more than 90 per cent of the children, and three-fourths of the Polish group had it two or more times a day."

In 1912, C. K. Taylor, a psychologist, made a study of coffee drinking by school children. He found that out of a group of 464 children, over 70 per cent of them were coffee drinkers. Moreover, and more important still, he discovered that those children who drank the most coffee received the lowest grades. There is no doubt but that coffee drinking by children is generally deleterious to the nervous system of the child. But the greatest harm done to children by this drink is its replacing milk in the diet. The Gary report, referred to above, states that coffee drinking by children "appears to have been inversely proportional to the use of milk. Not only do the schedules show about the same percentage of children drinking coffee as those lacking milk, but a comparison of coffee drinking by milk groups shows the use of coffee to increase markedly as the amount of milk decreases." Commenting upon the disastrous effect of replacing milk by coffee, the report states further: "To leave out milk and substitute coffee plays havoc with any diet, whatever may be its redeeming features."

It is a well known fact that children easily acquire a taste for coffee and are less willing to drink milk after being permitted to use coffee. Miss Lucy H. Gillett, Superintendent of the Nutrition Bureau of the New York Association for Improving the Poor, says in this connection that "children should never be given tea or coffee, not even to flavor milk. They will more often like milk if they are not first taught the combination of milk and coffee."

There are two important reasons why coffee should not be given to children. First, it has the harmful effect of crowding milk out of the dietary of the child. Second, it is an undesirable and unneeded stimulant.

In view of the fact that a large number of American children, especially in the industrial classes, are coffee drinkers, the matter is worthy of serious consideration.—*Mellon Institute of Industrial Research.*

MINNESOTA MEDICINE

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EDITORIAL

The Germ Cause of Cancer

Every announcement that a germ has been found as the cause of cancer is always received both by the profession and the laity with great interest. Apparently it is a simple explanation and everyone is now so thoroughly trained in the notion of the bacterial causation of disease that ready acceptance of any announcement of the type is not to be wondered at. The only difficulty is that there are so many candidates for election that it is difficult to make a choice.

In the past few years dozens of legitimate—and a considerable number of illegitimate—organisms have been brought forward as offering the final solution of the cancer problem. But if we look a little deeper into the question there are many difficulties to the ready acceptance of so simple an explanation. In the first place it is perfectly easy to isolate organisms of a variety of types from cancer, both human and animal. Apparently, however, these organisms are harmless saprophytes in the tissues. Possibly some of them play a part in giving rise to the chronic inflammation which underlies the appearance of many carcinomata, occupying the same rôle as some of the coarser organisms such as the Bilharzia, which induces cancer of the bladder, or the Paragonimus, which is a frequent cause of cancer of the liver in China and Japan. With the elimination of the ordinary types of visible organisms attention has been directed to the possibility of an ultramicroscopic parasite. The first real evidence in support of this belief was discovered by Rous in a tumor of the fowl, which could be transplanted from one animal to the other by the filtered juice of the tumor, the agent, whatever it was, passing a number 5 Berkefeld. Rous was never able to isolate a parasite and the matter was dropped for a number of years until Nuzum announced that a filterable organism which he had isolated was capable of causing cancer. Nuzum's results were enthusiastically supported by Ochsner, but on the whole the scientific fraternity was inclined to look rather coldly upon Nuzum's claims, especially as the number of true tumors which he produced was small and their appearance might be explained by spontaneous occurrence in the animals which he used.

The most recent germ is that of Gye and Barnard, who believe that they have demonstrated an ultramicroscopic parasite as the cause for all types of cancer. Their demonstration, however, rests upon extremely difficult and technical procedures and most bacteriologists and pathologists are unwilling to accept their hypotheses without very thorough checking. As a matter of fact, Gye has not even proved that the Rous chicken sarcoma with which he worked is caused by a parasite, though he and Barnard believe that certain forms which they have photographed do represent the causative organism. It may take many years to prove or disprove the theories which they have advanced. One real achievement, however, has been the demonstration of the possibility of the transfer by a filtrate of a mouse tumor, though the necessary procedure is much more complicated than that necessary for the chicken sarcoma of Rous.

Despite, therefore, these announcements, most of those who are working on cancer still hold that the process is not directly incited by bacteria. Their reasons are that in general cancer cannot be transferred from one animal to another if the cells

are robbed of their vitality by freezing, by crushing with sand in a mortar or after killing by *x*-ray. Nor is any immunity produced by the injection of large quantities of tumor tissue so devitalized. The organisms with which bacteriologists are familiar are all foreign to the animal host and therefore act as antigens and give rise to some type of immunity. No such immunity, however, is detectible after the injection of tumor material. Bacteria which infect cells also, so far as we know, act destructively upon the invaded individual cell instead of causing it to proliferate. The easy production of cancer by certain irritating chemical substances, such as tar, also seems difficult to explain on a bacterial basis. The occurrence of congenital tumors, growths containing elaborate embryonic structures, rudimentary voluntary muscle fibers and nerve tissues, are also difficult to interpret in terms of bacterial stimuli. So, too, the elaborate genetic studies made on mice by Maud Slye do not accord with a bacterial origin. The universal occurrence of cancer in all races of mammals and in all parts of the world implies the presence of an organism of a geographic distribution unknown to other types. Thus while the bacterial cause of cancer is always possible from a philosophical point of view, the organism must be so different from any which we now know that those who have been trained to look upon cancer as a life phenomenon with merely abnormal growth capacities in the tissues are not ready to accept the new idea without extraordinarily cogent proof. Such proof has by no means been brought forward in support of any of the organisms so far isolated, and it would seem wise to wait until it is forthcoming before changing long established views of the origin of cancer.

FRANCIS CARTER WOOD,
Director of the Institute of Cancer Research,
Columbia University, New York.

Anterior Poliomyelitis in Minnesota

Minnesota during the past fourteen months has suffered its most severe epidemic of anterior poliomyelitis. There have been reported to the State Board of Health nearly one thousand cases and a record of ninety deaths, showing the severity of the 1925 epidemic. The exact number of so-called abortive cases, which were numerous, according to various physicians connected with the epidemic, will never be known. Many mild cases with only slight muscular weakness or slight remaining paralysis are seen daily by physicians, who find the patient doubtful about the time of attack. The greatest number of cases are in the southeastern counties; there are only a few cases in the northern counties.

An examination of many reports of cases, as they have come in to the State Board of Health, discloses an unusual number of the bulbar type of cases and a marked tendency to paralysis of the upper extremities and trunk. A tendency to early recovery has also been noted in many cases examined.

A very large number have received Rosenow's serum as a curative and many have been inoculated as a preventive measure.

A final tabulation of the results should lead to a more definite conclusion as to the value of the serum. Certain difficulties, however, present themselves. Rosenow feels that the serum should be administered before the onset of paralysis. An abnormal cell count in the spinal fluid in the presence of an acute febrile attack with a red throat is considered sufficient indication for serum administration, when poliomyelitis is epidemic. The great variation in the paralysis and recovery and the difficulty in early positive diagnosis before the onset of paralysis are factors which are likely to make evaluation of the serum treatment in this disease difficult.

Early, repeated spinal drainage has been of great value in relieving pain, headache and delirium in the acute stages. It is important for medical men to remember that intelligent care during the first six months of anterior poliomyelitis results in great benefit. According to well-known authorities, massage, manipulation, exercise, stimulation of muscles by electricity or even weight bearing are to be absolutely prohibited until all tenderness over nerve trunks of the extremities has disappeared. Rest in bed, mechanical supports, extra warmth through clothing and radiant heat is the method used until the so-called neuritis has disappeared. Manipulation, massage and muscle strain only tend to exaggerate and prolong tenderness and prevent recovery.

After tenderness or neuritis has disappeared—which may require weeks or months—the patient is ready for intelligent treatment: through supports

and braces to prevent deformity and muscle strain; extra warmth to affected parts; extra clothing, radiant heat, hot baths, electric lamps, etc.; gentle massage, frequent and of short duration, and muscle training or re-education of muscles through a competent physician of physiotherapist.

If such measures are used we may expect the following return of muscles as cited by the late Dr. Lovett, whose knowledge was gained by the examination of over five thousand cases of poliomyelitis following the recent epidemic in the New England States:

PERCENTAGE OF GAIN IN THREE YEARS

	Approximate Per Cent		
Upper Extremities—	Full recovery	Partial recovery	No recovery
Wrist extensors	68	12	20
Wrist flexors	63	9	28
Trapezius	61	22	17
Pectoralis major	59	21	20
Biceps	59	25	16
Triceps	59	20	21
Posterior deltoid	56	22	22
Anterior deltoid	53	29	18
Trunk—			
Abdomen	30	19	51
Back	78	17	5
Neck	90	8	2
Lower Extremities—			
Gluteus maximus	34	26	40
Peroneals	32	28	40
Hip flexors	30	33	37
Hamstrings	24	49	27
Gastrocnemius	22	40	38
Hip abductors	21	34	45
Quadriceps	21	42	37
Posterior tibials	14	28	58
Anterior tibials	12	36	52

Diphtheria Immunization

At the annual meeting of the State Sanitary Conference, a report of which appears in part elsewhere in this issue, much attention was paid to the desirability of general immunization of school children throughout the state by means of inoculations with diphtheria toxin-antitoxin.

The procedure is simple, consisting of the hypodermic injection of 1 c.c. of the mixture on three occasions at weekly intervals. The dose recommended by the New York Health Department for the last few years is only one-thirtieth the strength of that originally used and has proven just as effective as the stronger dose, using the Schick test for control. Local and general reactions are negligible.

Since August 1, 1915, there has been free distribution of diphtheria antitoxin in Minnesota. Increase in yearly appropriations for this purpose and reduction in price has led to the accumulation of a surplus in funds which it has been suggested might well be expended for active immunization with the toxin-antitoxin mixture. The resolution was passed by the Conference requesting the State Board to provide diphtheria toxin-antitoxin for distribution to health officers, who, in co-operation with school authorities, may arrange for immunization of school children.

The free distribution of diphtheria antitoxin in Minnesota since 1915 has cut down the mortality of the disease about as much as can be expected from this method. And yet during the years 1918 to 1924 there occurred 28,852 cases of diphtheria in Minnesota with an average of 238 deaths each year. Over a third of the deaths occurred during the first five years of life and four-fifths of the deaths occurred under the age of puberty. The immunization of all children is the new goal set.

There is one phase of the immunization of children of school age which should not be overlooked. Immune school children may easily become carriers of diphtheria without developing clinical manifestations and bring the disease home to the unimmunized younger children in the household. Children under school age are even more susceptible than children in the primary school grades. Any campaign for immunizing school children against diphtheria should include propaganda and provision for immunizing children of pre-school age from the age of six months up, just as in the case of smallpox vaccinations. This point cannot be too greatly emphasized.

Asthmolysin.—According to the advertising, Asthmolysin is a German proprietary and is "a combination of the suprarenal and pituitary hormones in distinct proportion," which is prepared by a "special method." In the series of articles on glandular therapy published under the auspices of the Council on Pharmacy and Chemistry, the opinion was given that the use of pituitary in bronchial asthma is contraindicated. (Jour. A. M. A., October 27, 1925, p. 1243.)

OBITUARY

FLORENCE C. NICHOLS BAIER

Florence C. Nichols Baier was born at Columbia, Ohio, Sept. 21, 1854, the daughter of George Lewis and Elizabeth Adams Nichols.

She entered Oberlin College in 1871 and received there the degrees of B.A. and M.A. She taught in the country schools of Ohio and later in the Academy of Oberlin College during her college years, and after graduation she taught in Calumet, Mich., Rochester, Minn., and Buffalo, N. Y., where she became Dean of the New York State Normal School.

In 1885 she married Rev. Leo. Baier, President of Hannibal College, of Missouri. Following his death two years later she became a teacher of Latin in Minneapolis Central High School, and during this time pursued the study of medicine, graduating from the Hamline College of Physicians and Surgeons in 1897.

She practiced in Owatonna, Minn., 1898 to 1900, and for two years was resident physician of the State Hospital for the Insane at Jamestown, N. D. Since 1902 she had carried on a general practice in Minneapolis until about a year ago, when failing health forced her to give up her work. She died Oct. 3, 1925, at the age of 71, after a month's illness in bed at the home of her daughter in Batavia, Ill.

She is survived by a sister, Mrs. Elizabeth Bentley, of Minneapolis, and a daughter, Mrs. C. E. Ward, a well-known author, of Batavia, Ill.

Dr. Baier was a member of the Vine Congregational Church. She was a member of the Hennepin County Medical Society, the Minnesota State and American Medical Associations, as well as of a number of college, alumni, and teachers' organizations. She was permanent secretary of the Oberlin College Class of 1875. She had from her earliest youth been an ambitious student and an enthusiastic educator, carrying her studies into her adult years. After her years of actual teaching were over she gave generously of her time, talents and energy to numerous educational organizations and institutions and identified herself particularly with all movements for the political and professional advancement of women.

J. C. Michael,
J. H. Simons,
Olga S. Hansen, Chairman,
Historical and Necrologic Committee,
Hennepin County Medical Society.

DR. KNUTE HOEGH

Dr. Knute Hoegh, fellow of the American College of Surgeons and chief of surgeons at St. Barnabas Hospital, Minneapolis, died at his home November 2, 1925, after an illness of two and one-half years.

Dr. Hoegh, who was 82 years old, was born at Trondhjem, Norway, where he received his early education.

He was graduated from the medical school at Oslo University, Christiania, in 1869, and the same year came to America. In 1870 he removed to La Crosse, Wis., where he practiced for 18 years. Coming to Minneapolis in 1888, Dr. Hoegh practiced surgery at St. Barnabas Hospital and later was made chief of surgeons.

Dr. Hoegh was a prominent worker among Norwegians of this country, and in 1906 was decorated with the Order of St. Olaf by King Haakon of Norway, for "distinguished service among his fellow countrymen in the United States."

Surviving are his wife and three daughters, Mrs. E. C. Hibbee, Minneapolis; Mrs. F. M. Ayres, Indianapolis, and Mrs. Charles J. Bell, Bronxville, N. Y.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

MINNESOTA STATE MEDICAL ASSOCIATION

Plans for the 1926 annual meeting of the State Medical Association are well under way. The General Arrangements Committee of the Ramsey County Medical Society, under the direction of Dr. George Earl, St. Paul, has recommended the week of May 24 as the date for the meeting, which will be held in St. Paul. Monday, May 24, will be devoted to sessions of the Council and House of Delegates with a Medical Economics meeting scheduled for the evening. Both the doctors and their wives are cordially invited to attend the evening session. Scientific sessions will occupy Tuesday and Wednesday, May 25 and 26, followed by special clinics on Thursday and possibly Friday.

The program committee of the State Medical Association, composed of Dr. C. B. Wright, Minneapolis, chairman of the medical section; Dr. C. M. Smith, Duluth, secretary; Dr. Theodor Bratrud, Warren, chairman of the surgical section; Dr. Waltman Walters, Rochester, secretary, and Dr. E. A. Meyerding, association secretary, have requested that all members desiring to appear on the program send in the titles of their papers to the secretaries of the respective sections or to the association secretary, 11 West Summit Avenue, St. Paul.

Dr. W. F. Braasch, Rochester, first vice president of the association, will act as chairman of all joint meetings and of the General Arrangements Committee.

MINNESOTA STATE SANITARY CONFERENCE

St. Paul—Nov. 5 and 6, 1925

The annual meeting of the Minnesota State Sanitary Conference always furnishes interesting material for consideration, but is presented here briefly and only in part.

The statewide use of diphtheria toxin-antitoxin immunization received considerable attention this year. The procedure has been in use for about ten years and after some modification is now well established. Antitoxin for the past ten years has been distributed free of charge to physicians throughout the state. The mortality averaging about 57 per 1,000 the past seven years is about as low as can be obtained with antitoxin in the treatment and temporary immunization against diphtheria.

During the past seven years there have been 28,852 cases of diphtheria in the state with an average of 238 deaths a year from this cause. Thirty-seven per cent of these deaths occurred in children under 5 years of age (15 per cent of the cases). Thirty-one per cent of the deaths occurred in the age period of 5 to 9 years, although only 28.5 per cent of the cases fall in this age group. The susceptibility to diphtheria is greatest under school age.

A resolution was passed by the Conference requesting the State Board of Health to purchase diphtheria toxin-antitoxin for distribution to health officers who, in co-operation with school authorities, may arrange for the immunization of school children. The proposal was acceptable to the State Board and it is to be hoped that the Department of Administration and Finance will approve the expenditure.

Dr. O. McDaniel, Director of the Division of Preventable Diseases of the State Department of Health, presented the poliomyelitis figures. Cases had been reported from 81 of the 87 counties in the state since June 1. In June there were 11 cases reported; in July, 112 cases; in August, 311 cases; in September, 308 cases, and in October, 139 cases. Reports of 91 deaths had been received so far.

Following the State Conference of Social Work, Dr. Max Seham, chairman of the Health Section, presented a resolution in behalf of these paralyzed children to the Governor. Through him a special appropriation of the Calamity Board will be made available for carrying out a program outlined by Dr. Chatterton.

Dr. George McCoy, Director of the Hygienic Laboratory of the United States Public Health Service, Washington, D. C., reviewed the recent advances in medical science relating to the control and prevention of scarlet fever. He urged that physicians take advantage of the scarlet fever serum in the treatment of toxic cases and that susceptible children exposed to scarlet fever in the home be immunized. However, he stated that owing to the fact that constant improvement in methods is being made and new discoveries are likely to occur which will make these procedures of specific treatment and immunization more valuable just as was the case in the development of diphtheria antitoxin and toxin-antitoxin, it would be best to defer any general campaign for immunization against scarlet fever.

Dr. Ruth E. Boynton, Director of the Division of Child Hygiene, compared Minnesota with other states in relation to the health of mothers and infants. The infant mortality in Minnesota is much lower than that of the registration area of the United States. One reason for this is that the Division of Vital Statistics secures complete birth records. The death rates are figured on a basis of 1,000 living births reported. Minnesota's rate in 1924 was 56 deaths per 1,000 living births. The registration area shows a rate of 76, according to the census report of 1922.

Deaths due to the puerperal state in Minnesota are lower than in the registration area. The United States census figures for the registration area in 1923 shows the death rate from puerperal causes per 100,000 population at 15.6. Minnesota's rate in 1923 was 12.8. In 1924 it had fallen to 10.3. Better care of the prospective mother and better obstetric service will further reduce the deaths from puerperal causes.

Dr. O. McDaniel, Director of the Division of Preventable Diseases, reviewed the contagious disease situation of the past year. She stated that the smallpox epidemic was the most severe one in the history of the state. In the 20 months ending September, 1925, there occurred in Minnesota 4,041 cases of smallpox and 503 deaths. In the previous 25 years during which only one outbreak of the malignant type occurred, there were 79,638 cases and only 394 deaths. The malignant outbreak was in 1917, when 92 cases with 17 deaths occurred following the introduction of malignant smallpox from Canada.

Of the 503 fatal cases in the recent epidemic only one occurred in a person successfully vaccinated within 7 years previous to the attack. This was a 14-year-old boy who was vaccinated in March, 1921, and died of smallpox in January, 1925. He also had Hodgkin's disease and in January, 1924, had been given about one year to live by the Mayo Clinic.

88 deaths occurred in persons successfully vaccinated more than 7 years previous to the attack.

390 had never been successfully vaccinated, and 24 could give no history of vaccination and showed no scar.

Over 82 per cent of all the fatal cases had never been successfully vaccinated.

The last death from smallpox occurred August 1 in St. Paul. The state is practically free of smallpox at the present time. General vaccination has been carried out throughout the state.

Dr. Benjamin F. Simon, Health Officer of St. Paul, was unanimously elected president. Dr. B. F. Van Valkenburg of Long Prairie, Health Officer of Todd County, was elected vice president, and Dr. A. J. Chesley, secretary of the State Board of Health, was continued as secretary-treasurer for 1926.

ST. LOUIS COUNTY MEDICAL SOCIETY

The St. Louis County Medical Society held its annual session the evening of October 8 at the Hotel Duluth. There were present about seventy members.

The record of the year was reviewed by the president, Dr. F. H. Magney, and Dr. L. A. Barney was elected as his successor, with Dr. F. J. Lepak taking the place of secretary left vacant by Dr. Hilding Anderson.

The address of the evening was given by Dr. Herman Johnson, of Dawson, Minnesota, president-elect of the State Medical Association. The speaker reviewed the triumphant events of the past legislative session, stressing the results of effort and united action. Dr. C. B. Wright, of Minneapolis, who accompanied Dr. Johnson, spoke, also, briefly outlining the need of collective interest and effort in preparing for the next and succeeding legislative programs.

PARK REGION MEDICAL SOCIETY

At the recent annual meeting of the Park Region District and County Medical Society held in Fergus Falls, the following officers were elected for the coming year: President, Dr. P. G. Cowing, Evansville; vice president, Dr. A. J. Lewis, Henning; secretary-treasurer, Dr. Theo. Satersmoen, Pelican Rapids.

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

The Minnesota Academy of Ophthalmology and Otolaryngology at the annual meeting elected officers as follows: D. L. Tilderquist, M.D., President; E. R. Bray, M.D., 1st Vice President; J. M. Robinson, M.D., Duluth, 2nd Vice President; W. E. Camp, Chairman Council; John H. Morse, M.D., Secretary-Treasurer.

Dr. Thomas Shastid of Superior was elected to honorary membership in the Academy.

The Academy met at the Minneapolis Club, Friday evening, November 13, at 6 o'clock, for dinner, and held its meeting in the Hennepin County Library at 8 o'clock, with Dr. D. L. Tilderquist of Duluth, the incoming President, in the chair. Dr. Virgil J. Schwartz presented a paper, "Three Friends Who Made Ophthalmological History—Donders, Bowman and Von Graefe." Clinical cases were reported.

SOUTHWESTERN MINNESOTA MEDICAL SOCIETY

The Southwestern Minnesota Medical Society met Oct. 29, 1925, at Lakefield, Minn. The program was as follows:

President's Address—Dr. J. M. Hilger, Iona, Minn.

"Infant Feeding"—Dr. Ellsworth Johnson, Windom, Minn.

"Rural Obstetrics"—Dr. Wm. A. Piper, Mountain Lake, Minn.

"Melena Neonatorum"—Dr. Thos. Lowe, Windom, Minn.

"Caesarean Section"—Dr. L. L. Sogge, Windom, Minn.

Report of the Tri-State Medical Meeting—Dr. A. G. Chadbourne, Heron Lake, Minn.

The next meeting will be held in the New Ashton Memorial Hospital. Pipestone, Minn., in May, 1926.

The officers elected were: Dr. H. C. Doms, Slayton, Minn., President; Dr. A. G. Chadbourne, Heron Lake, Minn., Vice President; Dr. E. G. McKeown, Pipestone, Minn., Secretary-Treasurer.

The censors elected were: Wm. A. Piper, Cottonwood County; W. J. Taylor, Pipestone County, and C. O. Wright, Rock County. All were elected to serve for three years.

OF GENERAL INTEREST

Dr. H. L. Goss, formerly of Minneapolis, is now engaged in practice in Seattle, Washington.

Dr. H. E. Binger has announced the new location of his offices at 710 Lowry Bldg., St. Paul.

Dr. Robert Guilmette has taken over the practice of Dr. O. A. Kibbe at Canton, Minnesota. Dr. Kibbe is now located in Minneapolis.

Dr. Paul A. Schmidt of Mapleton has returned to his former location at Good Thunder, where he succeeds Dr. George Schlesselmann in his practice.

Dr. N. W. Haddow of Chippewa Falls, Wisconsin, and Dr. E. H. Smith of Minneapolis have become associated with Dr. Iver S. Benson of Montevideo and have organized the Montevideo Clinic.

Dr. M. G. Peterman, associate in pediatrics at the Mayo Clinic, Rochester, has accepted the position of Director of Laboratories and Research at the Children's Hospital, Milwaukee. Dr. Peterman will also have a private consultation practice in Milwaukee.

Three medical fraternities head the list of all professional fraternities at the University of Minnesota in scholastic standing, as shown in a recent statistical report given out by E. E. Nicholson, dean of student affairs. The order of their rank is as follows: Phi Delta Epsilon, Sigma Delta Epsilon and Phi Chi.

Dr. A. J. Chesley attended the fifth annual conference of Health Officers and Public Health Nurses conducted by the Michigan Department of Health and the Michigan Public Health Association, at Lansing, Mich., in November. He also took part in the sixth annual conference of Health Commissions and the State Department of Health of Ohio.

At a meeting of the graduates of the Ensworth Medical College, held in October at Kansas City, Missouri, a medical college alumni association was organized with a view of promoting acquaintance and good fellowship among the graduates of the institution. All professors and graduates of the Ellsworth, Central and Northwestern Colleges of St. Joseph are requested to send their names to the Secretary, Dr. Charles Wood Fassett, 115 East 31st Street, Kansas City, Missouri, for full information and application blank.

"Four Cases of Splenomegaly With Anemia" was the subject of the evening for the meeting of the Minnesota Pathological Society, held November 17 at the University of Minnesota Medical School, in the Institute of Anatomy. The following appeared on the program: Dr. William A. O'Brien, "Primary Tuberculosis of the Spleen"; Dr. Kano Ikeda, "Brill's Giant Follicular Splenomegaly"; Dr. Hal Downey and Dr. C. J. Watson, "Megakaryocytic (?) Leukemia"; Dr. H. L. Ulrich and Dr. C. J. Watson, "Banti's Disease."

News has been received from Vienna that Dr. Baron Pirquet, world famous specialist in pediatrics and a professor in the School of Medicine at the University of Minnesota for ten days, is dying at his home in Carlsbad as the result of injuries received when he jumped from a hotel balcony following an hallucination that he was surrounded by flames. Baron Pirquet, who accepted a professorship in the School of Medicine in 1923, astounded administrative authorities when he resigned from the position after ten days, stating that he was homesick and needed by people of his homeland in the hospital of Vienna.

Under the leadership of Dr. Ralph W. Webster, of Chicago, a nation-wide committee of doctors has been organized to raise a fund of $250,000 as a contribution from Rush Medical College alumni toward the general development funds of the University of Chicago. This sum of $250,000 to be given to Rush doctors will be part of the $2,000,000 which alumni of the University are raising and which is to go toward the comprehensive program of construction and endowment covering the immediate needs of the institution. The medical schools of the University, of which Rush is now a part, will be able to control their

policies of education and adapt them to the best developments in medicine in the future. A great program of postgraduate medical education will be carried on in the new buildings of Rush on the West Side, the Presbyterian Hospital, the Central Free Dispensary, the John McCormick Memorial Institute for Infectious Diseases, the Children's Memorial Hospital, the Home for Destitute Crippled Children, the Cook County Hospital, and the Country Home for Convalescent Children. Postgraduate medical training and instruction is needed especially in the middle west, and the medical profession will appreciate this service.

CHRISTMAS SEALS

The eighteenth annual Christmas Seal sale to raise funds for continuing the general educational campaign against tuberculosis and for health is now on. The state campaign directed by the Minnesota Public Health Association and its affiliated county units reaches into every corner of Minnesota and hundreds of volunteer Christmas Seal salesmen from school boys and girls to prominent society and club women and busy men are bending their efforts to make the sale a success.

An unusually large number of physicians are this year taking an active part in the Christmas Seal sale, and also in the activities of the County Public Health Association throughout the state. Nearly every county organization has one or more of the local physicians among its officers or board of directors. The educational side of the Christmas Seal sale will be especially stressed this year and a Speakers' Bureau, headed by the tuberculosis sanatorium physicians, has been organized.

The following are included in the statewide educational health work carried on this year with the Christmas Seal funds:

Publication of the Northwestern Health Journal;

Tuberculosis Clinics to search out unsuspected cases early and to popularize the "periodic medical examination" habit;

Children's clinics;

Publication and distribution of free literature and posters;

Presentation of the book "Health Training in Schools" to teachers throughout the state;

Enrollment of school children in the Modern Health Crusade, a plan in which they are awarded rank for the daily practice of health habits;

Exhibits, motion picture films, lectures and radio talks;

A fresh air camp for pre-tuberculous children;

Partial support of a children's preventorium;

Nutrition demonstrations for underweight school children;

Public health nursing service;

Occupational placement bureau for ex-sanatorium patients.

"Buy and Use Christmas Seals" is the appeal of the Minnesota Public Health Association to physicians throughout Minnesota. The cheery little health stamp on your Christmas mail means that you are a shareholder in the organized fight against tuberculosis.

NEW AND NON-OFFICIAL REMEDIES

The Council on Pharmacy and Chemistry has accepted the following articles:

GILLILAND LABORATORIES:
- Schick Test.
- Typhoid-Paratyphoid Bacterial Vaccine Immunizing.

LABORATORY PRODUCTS CO.:
- Protein S.M.A. (Acidulated).

ELI LILLY & CO.:
- Antistreptococcic Serum.
- Normal Horse Serum.
- Pertussis Vaccine.
- Pneumococcus Vaccine Prophylactic.
- Staphylococcus Aureus Vacine.
- Staphylococcus Vaccine.
- Streptococcus Vaccine.
- Vaccine Virus.

MALLINCKRODT CHEMICAL WORKS:
- Bromeikon.
  - Bromeikon 5 Gm. Ampules.

MERRELL-SOULE CO.:
- Vi-Mal-Dex (Orange).

H. K. MULFORD CO.:
- Pertussis Bacterin-Mulford.
- Typho Bacterin.
- Typho-Serobacterin.
- Typho-Serobacterin-Mulford Mixed.

NATIONAL ANILINE & CHEMICAL CO.:
- Tetraiodophthalein Sodium-"National."
  - Tetraiodophthalein Sodium-"National" Vials 3½ Gm.

PARKE, DAVIS & CO.:
- Corpora Lutea Desiccated-P. D. & Co.
  - Capsules Corpora Lutea Desiccated-P. D. & Co., 2 grains.
  - Capsules Corpora Lutea Desiccated-P. D. & Co., 5 grains.
  - Tablets Corpora Lutea Desiccated-P. D. & Co., 2 grains.
  - Tablets Corpora Lutea Desiccated-P. D. & Co., 5 grains.

SWAN-MYERS CO.:
- Sterile Ampules of Mercury Oxycyanide, 0.008 Gm.
- Sterile Ampules of Mercury Oxycyanide, 0.01 Gm.
- Sterile Ampules of Mercury Oxycyanide, 0.016 Gm.

NON-PROPRIETARY ARTICLES:
- Tetrabromphthalein Sodium (formerly called Tetrabromphenolphthalein Sodium).
- Tetraiodophthalein Sodium.

LEDERLE ANTITOXIN LABORATORIES:
- Concentrated Tetanus Antitoxin (Globulin)-Lederle
- Scarlet Fever Streptococcus Antitoxin-Lederle (Refined and Concentrated)

RADIUM LIMITED, U. S. A.:
- Saubermann Radium Emanation Activator, 100,000 Mache Units

E. R. SQUIBB & SONS:
- Rabies Vaccine-Squibb Semple Method 14 Dose Treatment

Protein Extracts-Mulford.—Liquids obtained by extracting the protein of substances believed to be the cause of specific sensitization. For a discussion of the actions and uses, see Allergic Protein Preparations (New and Non-official Remedies, 1925, p. 278). Protein Extracts-Mulford are used both for diagnosis and treatment. They are marketed in 5 c.c. vials.

Insulin-Squibb 10 Units, 10 c.c.—Each c.c. contains 10 units of insulin-Squibb (New and Non-official Remedies, 1925, p. 174). E. R. Squibb & Sons, New York.

Insulin-Squibb 20 Units, 10 c.c.—Each c.c. contains 20 units of insulin-Squibb (New and Non-official Remedies, 1925, p. 174). E. R. Squibb & Sons, New York.

Insulin-Squibb 40 Units, 10 c.c.—Each c.c. contains 40 units of insulin-Squibb (New and Non-official Remedies, 1925, p. 174). E. R. Squibb & Sons, New York.

Insulin-Squibb 80 Units, 10 c.c.—Each c.c. contains 80 units of insulin-Squibb (New and Non-official Remedies, 1925, p. 174). E. R. Squibb & Sons, New York.

Neo-Silvol Ointment 5 Per Cent.—An ointment composed of neo-silvol (New and Non-official Remedies, 1925, p. 379), 5 per cent in a base composed of glycerin, benzoinated lard, hydrous wool fat and petrolatum. Parke, Davis & Co., Detroit.

Mercurosal Solution. — Each c.c. contains mercurosal (New and Non-official Remedies, 1925, p. 234), 0.025 gm. (5/13 grain), in distilled water containing 0.1 per cent of sodium citrate. Parke, Davis & Co., Detroit. (Jour. A. M. A., Sept. 5, 1925, p. 745.)

Radon-Standard Chemical Co.—A brand of radon-N.N.R. For a discussion of radon, its actions and uses, see New and Non-official Remedies, 1925, p. 313. Radon-Standard Chemical Co. is supplied in the form of "implants" (minute glass tubes suitable for embedding in tumors), and in the form of larger tubes. Radium Chemical Co., Pittsburgh. (Jour. A. M. A., Sept. 12, 1925, p. 825.)

Iodipin 40 Per Cent.—An iodine addition product of sesame oil, containing from 39 to 41 per cent of iodine in organic combination. Iodipin 40 per cent is used as a contrast medium in myelography and pyelography for detecting urethral strictures and in the spinal column for the location of tumors. It is supplied in bulk and in ampules containing, respectively, 1 c.c. and 2 c.c. Merck & Co., New York.

Pertussis Bacterin-Mulford.—(New and Non-official Remedies, 1925, p. 354.) This is also marketed in packages of one 5 c.c. vial containing 2,000 million killed pertussis bacilli per c.c.; of one 20 c.c. vial containing 2,000 million killed pertussis bacilli per c.c.; and of four vials containing, respectively, 250, 500, 1,000 and 2,000 million killed pertussis bacilli per c.c. H. K. Mulford Co., Philadelphia.

Typho-Serobacterin.—(New and Non-official Remedies, 1925, p. 368.) This is also marketed in packages of three syringes containing, respectively, 1,000, 2,000 and 2,000 million killed sensitized typhoid bacilli; of three 1 c.c. vials, containing, respectively, 1,000, 2,000 and 2,000 million killed sensitized typhoid bacilli; and in thirty 1 c.c. vials, constituting ten tests of three doses. H. K. Mulford Co., Philadelphia.

Typho-Serobacterin-Mulford Mixed.—(New and Nonofficial Remedies, 1925, p. 369.) This is also marketed in packages of three hypo-units containing consecutive doses of a mixture of killed sensitized typhoid bacilli, killed sensitized paratyphoid bacilli A and killed sensitized paratyphoid bacilli B; of thirty 1 c.c. vials, being ten tests of three doses of a mixture of the three bacilli. H. K. Mulford Co., Philadelphia. (Jour. A. M. A., Sept. 19, 1925, p. 901.)

Theocalcine.—A double salt or mixture of calcium theobromine and calcium salicylate. It contains not less than 44 per cent of theobromine. Theocalcine acts like theobromine, but is claimed to be less likely to produce gastric irritation than the official theobromine sodio-salicylate. It is supplied in bulk and in 7½ grain tablets. E. Bilhuber, New York.

Vi-Mal-Dex (Orange).—A mixture containing, approximately, maltose, 28 per cent; dextrose, 10 per cent; dextrin, 48 per cent; orange juice sugars, 9 per cent; citric acid, 1 per cent; ash, 1 per cent; moisture, 3 per cent. One hundred gm. contains the equivalent of 93.5 c.c. of fresh orange juice. Vi-mal-dex (orange) is proposed as a carbohydrate food for use in the feeding of infants. In addition to the carbohydrates, dextrose, maltose and dextrin, it presents the antiscorbutic properties of orange juice. For use, vi-mal-dex (orange) is mixed with water or milk. Merrell-Soule Co., Syracuse, New York.

Sterile Ampules of Mercury Oxycyanide, 0.008 Gm.—Each ampule contains 5 c.c. of solution, representing 0.008 gm. (⅛ grain) of mercuric oxycyanide-N.N.R. (New and Non-official Remedies, 1925, p. 228). Swan-Myers Co., Indianapolis.

Sterile Ampules of Mercury Oxycyanide, 0.01 Gm.—Each ampule contains 5 c.c. of solution, representing 0.01 gm. (1/6 grain) of mercuric oxycyanide-N.N.R. (New and Non-official Remedies, 1925, p. 228). Swan-Myers Co., Indianapolis.

Sterile Ampules of Mercury Oxycyanide, 0.016 Gm.—Each ampule contains 3 c.c. of solution, representing 0.016 gm. (¼ grain) of mercuric oxycyanide-N.N.R. (New and Non-official Remedies, 1925, p. 228). Swan-Myers Co., Indianapolis.

Tetraiodophthalein Sodium. — Tetraiodophenolphthalein sodium. The sodium salt of a dibasic dye, tetraiodophenolphthalein. Tetraiodophthalein sodium contains not less than 53 per cent of iodine. It is used for the roentgenologic examination of the gallbladder. Following the intravenous injection or, if decomposition is avoided, the oral administration, the substance appears in the normal gallbladder in sufficient concentration to cast a shadow to the roentgen ray. The use of tetraiodophthalein sodium is in the experimental stage and workers are cautioned as to the selection of types of cases in which it is indicated and its possible toxicity in large doses.

Iodeikon.—A brand of tetraiodophthalein sodium-N.N.R. It is supplied in bulk and in 3.5 gm. ampules. Mallinckrodt Chemical Works, St. Louis.

Tetraiodophthalein Sodium-"National." — A brand of tetraiodophthalein sodium-N.N.R. It is supplied in bulk and in 3.5 gm. vials. National Aniline and Chemical Co., New York. (Jour. A. M. A., Sept. 26, 1925, p. 975.)

Protein S.M.A. (Acidulated).—A modified milk preparation having a relatively high protein content and a relatively low carbohydrate content. Each 100 gm. contains approximately: protein (of milk), 35 gm.; S.M.A. fat (consisting approximately of tallow oil, 0 to 10 per cent; cocoanut oil, 15 per cent; cacao butter, 20 per cent; cod liver oil, 7.5 to 12.5 per cent; tallow, 45 to 50 per cent), 22 gm.; carbohydrate (lactose), 28 gm.; ash, 6 gm.; moisture, 2 gm.; desiccated lemon juice, equivalent to 16.7 c.c. of fresh juice. The content of lactic acid is regulated so that when the substance is diluted according to directions the liquid will have a PH of 4.6. The use of protein S.M.A. (acidulated) is proposed as a means of checking diarrhea, in malnutrition and marasmus, and in the feeding of prematurely born infants needing a high caloric intake. Laboratory Products Co., Cleveland.

Bromeikon.—A brand of tetrabromophthalein sodium-N.N.R. (formerly called tetrobromphenolphthalein sodium) (New and Non-official Remedies, 1925, p. 141). Bromeikon is supplied in bulk and in ampules of 5 gm. Mallinckrodt Chemical Works, St. Louis.

Iron in Therapeutics.—It seems possible that much of the therapeutic uncertainty of iron administration may be cleared up by recent studies involving large numbers of nearly identical animals over long periods of time under uniform conditions, with respect to the effect of iron administration. It was found that iron was stored in the liver or spleen, but was not converted into hemoglobin. The experiments seem to show the futility of prescribing iron in anemia. On the other hand, the efficiency of food iron seemed pronounced. (Jour. A. M. A., October 10, 1925, p. 1140.)

Neurosine.—The Council on Pharmacy and Chemistry in 1915 reported that Neurosine (Dios Chemical Co.) is a shotgun nostrum which violates practically every principle of modern therapeutics. The manufacturers claim that each fluidounce contains: "40 grains C. P. Potassium Bromide, 40 grains C. P. Ammonium Bromide, 40 grains C. P. Sodium Bromide, 1 grain C. P. Zinc Bromide, 32 grains Extract Lupuli, .60 grain Extract Cannabis Indica, .075 grain Extract Belladonna, .075 grain Extract Henbane, 40 minims Extract Cascara Sagrada, .060 grain Oil Bitter Almonds, 5 per cent Alcohol and Aromatic Bitters." Neurosine, therefore, contains 121 grains of bromid in each fluidounce. The formula of Neurosine is, however, not featured by the promoter. The danger of administering such a preparation as Neurosine without knowing its bromid content is apparent. (Jour. A. M. A., October 10, 1925, p. 1155.)

Possible Danger of Poisoning From Mercurochrome.—Sufficient evidence has been published to show that mercurochrome causes little or no gastro-intestinal disturbance until it has been taken in large doses for a week or more. In New and Non-official Remedies it is stated that no systemic effects have been observed following the local application of mercurochrome. This, together with the fact that the preparation is offered for lay use only in small packages of the solution, would seem to make the use of mercurochrome by the laity no more dangerous than that of tincture of iodin. (Jour. A. M. A., October 17, 1925, p. 1242.)

CASE REPORTS

Members are requested to report interesting and unusual cases for publication in this department. Many cases reported at hospital staff meetings and similar meetings are very instructive and worthy of publication.

ACRIFLAVINE: ITS INTRAVENOUS INJECTION IN THREE CASES OF EPIDEMIC ENCEPHALITIS

C. EUGENE RIGGS, M.D.
St. Paul

In June, 1924, Drs. Strecker and Willey reported to the American Psychiatric Association four cases of epidemic encephalitis treated by the intravenous injection of acriflavine, believing with Dr. Solomon "that we should not sit back in a hopeless attitude but rather we should continue our attempts along this line." Dr. Hengstler and I have been giving acriflavine a fair and careful trial. Prognosis depends upon the (basic) pathology. No treatment can restore degenerated nerve cells. Therefore, in the earliest stages of the disease—the acute phase—before nerve cell destruction occurs, is the favorable time for experimental therapy. While we are using it in the chronic forms of encephalitis, it is the acute attack with which this clinical note is concerned.

More than twenty different therapeutic agents have been used in this disease with bitterly disappointing results—a specific is not yet in the offing. Acriflavine and mercurochrome in the acute stage appeal to the medical mind. The former, experience has shown, possesses real possibilities; the latter in infections of the central nervous system I believe to be utterly worthless. The importance of administering acriflavine early is emphasized by a case now under observation. Nine months ago she developed encephalitis. The symptoms were so mild that they were mistaken for a mild functional nervous state; within the past ten days there has occurred an acute flaring up of the disease. After six intravenous injections of acriflavine there has been no amelioration of the symptoms. Some years ago I advised sodium iodide intravenously in chronic encephalitis; extended observation has shown it to be a therapy of great value. Malarial inoculation as in paresis is believed to have demonstrated its worth. Acriflavine is now on trial.

The following three cases have been an interesting study and the apparently direct results following the injections have surprised us greatly; the improvement observed has equalled in every way that recorded by the writers above quoted, in their one acute case.

Case 1.—Miss C., Dr. Hengstler's patient. Age 24; referred by Dr. Nels Werner of Eau Claire, and Dr. Post of Barron, Wisconsin. She entered the hospital July 27, 1925, complaining of "a nervous breakdown." Family history

shows that father died of heart trouble; mother living and well; two brothers and three sisters living and well; one brother dead in infancy.

Patient, a domestic, always well prior to her present sickness; tonsils and adenoids had been removed. In February, 1925, she had an attack of la grippe, which laid her up for a few days. In April, 1925, her present trouble appeared. She was laid up for a week, complaining chiefly of being very tired, listless and somewhat restless. No appetite; dreamed a great deal at night. She improved and worked until a month ago, when her former symptoms returned. She complained of headache, a drawing sensation in the back of her neck, shooting pains in the left arm and a very tired feeling. She grew steadily worse and when seen by us she was very weak and tired; was unable to be up at all; there was severe headache and persistent vertigo. This vertigo was so severe that she was unable to stand on her feet unsupported without falling to the floor. Her nights were sleepless. She states that lately she has had to take a long time to think and is unable to correlate her thoughts; memory is poor. She says she has grown progressively worse; dreams at night disturb her; she is very listless and has no strength to do anything. There is no diplopia and no depression.

Neurological examination shows a strongly positive Romberg with a tendency to fall backwards. Her pupils and cranial nerves are normal; superficial reflexes normal; knee-jerks and Achilles jerks normal; there is no Babinski and no ankle-clonus; co-ordination and deep muscle sense are normal and sensation is normal to pain, touch and temperature. There is reduced muscle power in both arms and both legs. Examination of the eyegrounds was normal. Hemoglobin 62 per cent; blood pressure 114 systolic, 70 diastolic; urine negative; Wassermann negative; colloidal gold negative; sugar .111. There was no psychosis; she grew very restless during the examination, tired easily and became very dizzy when made to change position, and was very easily excited and agitated.

Case 2.—Miss K. Age 40; referred by Dr. James Gilfillan, St. Paul. First examined August 3, 1925; complained of fainting spells; family history shows the father died at 63 of arteriosclerosis; mother at 64 of gallbladder disease. Three brothers living and well.

Typhoid when six years of age; has always been a nervous individual; never strong; was unable to attend school for a time when a girl because of ill-health. She has always had so-called "hysterical attacks"; from childhood has suffered from migraine, which has greatly improved during the last two years.

Present illness began about three weeks ago, following an attack of la grippe which occurred in June and laid her up for a few days. There are sudden attacks of weakness, during which she falls down on the floor and all strength goes from her limbs so that she cannot get up unaided for several moments. She complains of cold feet, of a twitching in the muscles of the left forearm, of frequent momentary losses of consciousness. After such a spell her muscles and flesh feel very sore and she falls asleep. She states that for the past fourteen years she has had attacks of this kind but only for the past month has she had the minor attacks where she loses herself for a moment without falling. They have been occurring very irregularly every day or several days apart. On some days she has five or six. Since the last seizure, three weeks before we saw her, in walking she goes to the left.

Neurological examination, August 3, was negative in every respect. Hemoglobin 88 per cent; blood pressure 124 systolic, 60 diastolic; urine negative. Following the examination she returned to her home and during the next few days became very drowsy, sleeping most of the time, and was very indifferent to things going on about her. She was also so dizzy that she could not stand up unaided. Two visits at the home showed a rise of temperature in the afternoon to 99.5°. On August 13 she was sent to the hospital; a lumbar puncture was performed which showed the spinal fluid to be under normal pressure, clear in color, no cells, globulin negative; Wassermann negative; sugar 104.

The neurological examination repeated on this date showed a moderate bilateral Kernig, more pronounced on left. There was also some fibrillary twitching of muscles in the left arm and a very slight rigidity of the neck. Aside from this all reflexes were present and normal and sensation was normal. There was no diplopia at this time but close questioning brought out the fact that there had been fleeting periods of diplopia a few days before while she was at home. The outstanding features when admitted to the hospital were marked lethargy, severe vertigo, which showed itself on the least change of position of her head, some headache, the head falling backward or forward, and a generally very indifferent attitude, and exhaustion on slight exertion. In this patient encephalitis lethargica grafted itself on an essential epilepsy.

Case 3.—Age 33 years; seen in consultation with Dr. Chas. Hensel, to whose courtesy I am indebted for a report of this case. At midnight, July 6, 1925, the patient was awakened by a severe occipital headache; the next morning he said he felt weak and exhausted. He went to work as usual, but after reaching the office he had a bad vomiting spell. Unable to work, he returned home and rested forty-eight hours. Although suffering from backache which extended the whole length of the spine and which did not permit his sitting, but compelled him to stand or lie flat, he tried to work, but was forced to go home, where he remained in bed two and a half days. Essaying to go into another room, he fell unconscious to the floor; after twenty minutes, consciousness returned and with it a persistent vomiting, which continued for two days. He was sleepless and complained of acute pain in the back of the head and in the neck. He ran a temperature ranging from 99 to 101° for about a week. The pupils were very small, but equal and reacted sluggishly to light. There was rigidity both of the neck and spine; knee-jerks were exaggerated, left more than right; there was a double Kernig; no

Babinski; no ankle-clonus; sensation was normal. Lumbar puncture showed increased pressure. The spinal fluid contained a large amount of blood; Wassermann negative, as was also the culture. This case possessed unusual interest because two years ago this patient experienced an apparently similar attack, the blood in the spinal fluid being a marked feature of both illnesses.

Farquhar Buzzard has emphasized the hemorrhagic type of epidemic encephalitis, of which this undoubtedly is a typical example. There had been an approximate recovery; he showed personality changes and was not as strong as he was before the first attack. He tired easily and complained of weak spells. During both illnesses spinal drainage offered great relief, but under acriflavine intravenously, improvement was noticeable after the first few injections; recovery was rapid and uneventful. Dr. Hensel informs me that he now feels very much betetr than he did after his apparent recovery from the first attack.

Each of these three patients received eight consecutive intravenous injections of neutral acriflavine—a purified form. This drug, especially prepared for intravenous use, comes in ampules. It is dissolved in freshly made normal saline heated to the boiling point, enough acriflavine being added to make a 0.5 per cent solution. Mix thoroughly, and while at a boiling temperature filter through the best quality filter paper. Sterilize by direct boiling for five minutes and cool to body temperature in a dark place, because light induces chemical decomposition. Utmost care should be taken during the injection (which should be given immediately after the preparation of the solution) to prevent any escape of the fluid into the perivascular tissues, such a mischance causing redness and great pain over a region exceeding greatly the affected area. The dosage is 10 c.c. of a 0.5 per cent solution. As much as 30 c.c. can be administered with safety (Strecker & Willey). The patient should be told of its staining the urine, mucus and other secretion, otherwise this yellowish coloration may cause needless anxiety. In order to avoid distressing symptoms the injection should be given slowly at the rate of 10 c.c. in five minutes, in some patients even slower. If administered more rapidly there will occur a gasping respiration with air hunger, associated with a sensation of heat, affecting the mucous membrane of the respiratory tract, added to which is an intense lacrymation. After the first two or three injections our patients have experienced great relief and by the time the eight were given the improvement was truly remarkable. The Kernig, Babinski and other objective signs disappear slowly. In Case 2, fever was one of the most persistent symptoms. There is no rule in epidemic encephalitis for convalescence; it may be distressingly slow or dramatically rapid, as in a case seen recently with Dr. Cremer of Hastings, where after spinal drainage recovery was a matter of a comparatively few days.

I am making no claim for acriflavine. I am in no sense an enthusiast, but the apparent benefit derived from this drug in these cases seems more than an accident, and, as Dr. Strecker states, it is a logical method of approach and I believe a justifiable form of experimental therapy.

PROGRESS

Abstracts to be submitted to Section Supervisors.

Members are urged to abstract valuable articles which they run across in their reading and send the abstracts to the physicians in charge of the respective sections. In order to avoid duplication it would be well to communicate with one of the section supervisors before the article is abstracted.

SURGERY

SUPERVISORS:
DONALD K. BACON,
LOWRY BLDG., ST. PAUL
VERNE C. HUNT,
MAYO CLINIC, ROCHESTER

FINAL RESULTS OF THE OPERATIVE TREATMENT OF GASTRIC ULCER: Meyer, Karl A., Brams, W. A., and Graves, W. N. (Ann. Surg., 1925, Vol. LXXXI p. 1002). A series of 22 cases of gastric ulcer is reported, in which a Polya type of stomach resection had been performed. All of these cases had been treated medically without permanent relief; and clinical evidence pointed to chronic ulcer of considerable severity. A postoperative study of 18 cases at varying periods showed absence of free hydrochloric acid in all; the emptying time of the stomach, as shown by the *x*-ray, was rapid in 10 to 15 cases re-examined; the bowels were normal in 10 out of 12 instances; and diarrhea was present in only one case. The patients were greatly improved after operation, as shown by freedom from symptoms, gain in weight, and return to former occupation.

The authors consider pyloric resection the method of choice in treating chronic gastric ulcer because it removes the ulcer-bearing portion of the stomach, and eradicates those factors such as gastric juice and retention of stomach contents, which are considered to play an important part in the formation and recurrence of peptic ulcer.

J. K. Holloway, M.D.

APPENDECTOMY: C. A. Roeder, M.D. (Arch. Surg., 1925, Vol. II, pp. 18-24). In 105 explorations of the cecum the author found postappendectomy adhesions present in 98, and of these only 8 were of negative significance. In 8 of the 90 the cecum was adherent to the parietal peritoneum in the line of previous incision. In 60 the great omentum was adherent to the head of the cecum. In 11 loops of terminal ileum were adherent to the meso-appendix stump and to the head of the cecum. In this group there occurred three bowel obstructions, two due to bands from the old meso-appendix, and one due to a band from the site of the previous appendix stump. In 11 cases adhesions were confusing, involving loops of ileum, the great omentum, and cecum. Thirty-two of 90 patients complained of constipation starting for the first time after appendectomy. In these the cecum was found adherent

in such a manner that its function as a contracting diverticulum was interfered with.

Roeder considers the purse-string suture and the stump of the appendix largely responsible for the formation of adhesions. As the cecum is very thin walled any type of Lambert suture frequently penetrates the cecal mucosa, thus spreading infection. The stump of the appendix is seldom rendered sterile even with a cautery, unless the mucosa in the deepest portion is attacked. The cautery seldom reaches this area. Phenol is the best chemical substance to use. Crushing forceps applied near the base frequently force bacteria through the coats of the appendix; and the crushed groove leaves an infected pocket in the cecum if the stump is inverted.

These contentions are supported by cultural evidence. Eighty per cent of the purse-string sutures and 24 per cent of the crushing forceps gave positive cultures. However, not one of the 100 patients indicated any signs of postoperative infection.

The author believes improvement in results would follow covering the mesenteric stump, dispensing with crushing forceps, sterilization of the stump with phenol, and replacing the appendiceal stump if not inverted into the peritoneal cavity so that adhesions form only on the posterolateral peritoneum.

The inverting suture is ideal if penetration of the cecal mucosa can be avoided. When difficult to apply, this suture may be abandoned, provided the stump of the appendix is carefully sterilized.

J. K. Holloway, M.D.

CHRONIC PANCREATITIS AS A CLINICAL ENTITY: J. William Hinton (S. G. and O., 1925, xli, 422). Frequently following cholecystectomy for cholecystitis or cholelithiasis the patient may have or continue to have acute exacerbations of pain similar to those he had previous to operation. The explanation of these attacks often leads one to suspect an overlooked calculus in the common bile duct, but the author feels that in many instances the symptoms are due to an acute exacerbation of a chronic pancreatitis.

The etiology of acute pancreatitis seems to be in the majority of instances a lymphangitis. The mark of Franke has definitely shown that the lymphatic drainage from the gallbladder and biliary tract is to the head of the pancreas. Braithewaite has shown a direct lymphatic drainage from the ileocecal region to the subpyloric glands. Pancreatic infections usually begin in and are confined to the head of the pancreas. In the majority of instances the author feels that the gallbladder or biliary tract is the source of infection in chronic pancreatitis.

The acute attacks of pancreatitis following cholecystectomy are often similar to the attacks of pain the patient had before operation. The pain is sudden in onset, constant, and may be in either the right upper quadrant or left kidney area. The attack may last from a few hours to 48 or 72 hours. Vomiting is usually an outstanding symptom. The vomitus is clear or slightly bile stained. Because of the sudden pain and vomiting, high intestinal obstruction may be suspected, but the patient does not appear so ill as do those with intestinal obstruction. The extremely severe cases may show slight jaundice. On physical examination the abdomen is usually not distended nor is it markedly rigid. There is usually an indefinite tenderness in both upper quadrants. The temperature is often normal, but may reach 100. The milder cases have a normal or slightly increased leukocyte count; urine is negative.

The author emphasizes the fact that one should not be too anxious to explore these cases, as many of the patients gradually recover after the primary focus has been removed. The cases that are reoperated continue to have recurrent attacks and common duct drainage does not seem to be effective.

CONCLUSIONS

1. Some of the recurrent attacks of upper abdominal pain following cholecystectomy seem to be due to acute exacerbations of a chronic pancreatitis.

2. The diagnosis should be arrived at by a very careful process of elimination.

3. Some of these cases spontaneously cure themselves if given the opportunity.

4. Surgery employed in these cases does not seem to cure the condition or prevent subsequent attacks.

C. S. Williamson, M.D.

PEDIATRICS

SUPERVISORS:
CHESTER A. STEWART,
LA SALLE BLDG., MINNEAPOLIS
ROY N. ANDREWS,
MANKATO CLINIC, MANKATO

GASTRIC DIGESTION IN NEW-BORN INFANTS: C. Griswold, M.D., and A. T. Shohl, M.D. (Amer. Jour. of Diseases of Children, October, 1925). The pH values for the gastric contents of unfed infants agree weith those in the literature which were obtained by titration. They demonstrate the presence of free hydrochloric acid. The pH 2.6 was less acid than that of Tangl (pH 1.3 to 1.8) for pure gastric juice. But no other excretion or secretion of the body could yield so acid a reaction; the material was unquestionably gastric juice.

The author's buffer values approximated those of other workers who used pure gastric juice. Just what constitutes the stimulus to this secretion of hydrochloric acid is not known. Pollitzer holds to the view that the ingestion of amniotic fluid during labor is responsible because he found albumin in the gastric contents. The presence of food is not necessary to stimulate the secretion of gastric juice. It may be reflex, from sucking, "psychic" or due to hunger, and may normally precede the ingestion of food in an infant.

The pH values of the gastric contents withdrawn one hour after a test meal in the new-born infants are more acid than those of a group of infants ranging from 30 to

19 months of age. The pH averaged 2.5 and 2.6 for the new-born infants; for the older infants, 76 per cent of the values lay between pH 3.9 and 4.6. At the end of one hour, after the ingestion of a partly skimmed milk mixture, digestion in new-born infants has been completed. This is shown by the high hydrogen ion concentration, the low buffer value and the small volume of gastric contents recovered. The infants undoubtedly have an increased capacity for hydrochloric acid secretion and gastric digestion. Practically, it would seem logical to feed new-born infants a more concentrated and a more alkaline food.

R. N. ANDREWS, M.D.

ALLERGIC MANIFESTATIONS IN INFANCY AND CHILDHOOD: George Piness, M.D., and Hyman Miller, M.D. (Arch. Ped., September, 1925). The clinical manifestations resulting from the introduction of such proteins are dependent in character, not on their site of entry into the body but on the particular tissue or tissues which may be sensitized. Thus, in one individual, it may be the lining mucous membrane of the respiratory tract resulting in hay-fever and asthma, and in another it may be the skin, resulting in urticaria or eczema.

Perhaps most often overlooked in infancy and childhood are the allergic disturbances of the nose and throat. The individual suffering from this allergic manifestation complains of almost constant "cold in the head," characterized by spells of sneezing, coryza and obstructed nasal breathing. Examination shows great hypertrophy of the tonsils and adenoids, the nasopharynx studded with masses of lymphoid tissue. Removal of tonsils, adenoids and turbinates does not relieve the symptoms. In fact, such removal often means but a regrowth of tissue consequent upon the lymphoid hypertrophy characteristic of protein sensitization.

If the respiratory mucous membrane is sensitized beyond the nasopharynx, that is in the bronchi and bronchioles, these patients add to their history frequent attacks of bronchitis with or without fever and with or without asthma. Sensitization of the gastrointestinal tract is often present, being characterized by the more or less vague abdominal distress and loss of appetite.

Occasionally in so-called "egg poisoning," an individual on partaking of even the minutest quantity of egg, immediately experiences a burning sensation of the lips, mouth and esophagus, followed by swelling of their mucous membranes and great difficulty in breathing.

The author finds the allergic child vaguely nervous, irritable, difficult to control, having little appetite and suffering from enuresis.

Perhaps the most common and generally recognized example of protein sensitization in infancy and childhood is eczema. On testing these infants, skin reactions to a varying number of food proteins are frequently obtained. The removal of these proteins from the diet of the mother often results in the clearing up of the eczema in the child.

In the bottle-fed infant with eczema, the feeding problem may be complicated by a sensitization in cow's milk. The necessity for removal of this food from the diet may be met by substituting goat's milk or, if sensitization to both goat's and cow's milk is present, the advisability of permitting the eczema to remain and caring for the general welfare of the infant must be considered.

In addition to the food proteins as a cause of eczema, one must also take into account the production of eczema by contact with substances such as with wool, silk or pollens, such cases being not at all uncommon.

Another skin manifestation of allergy is urticaria.

The prognosis as to recovery in any allergic manifestation in which an attempt is made to determine the offending protein is very good.

R. N. ANDREWS, M.D.

THE COMPARATIVE NUTRITIONAL VALUE OF WHITE AND WHOLE WHEAT FLOUR: C. Ulysses Moore, M.D., and Jessie Laird Brodie, B.A. (Arch. Ped., September, 1925). No other class of foods undergoes so great a change in the process of preparation as do the cereal grains. Our modern processes of milling wheat, our most commonly used cereal, eliminate the germ and most of the superficial layers of the kernel. Almost 30 per cent of the original grain is omitted from "patent flour," and the deplorable fact is that this discarded 30 per cent contains practically all the vitamin element and about 75 per cent of the mineral constituent of the cereal.

White mice on a properly balanced diet containing whole wheat flour increased in weight four times as rapidly as did their brothers on a chemically identical diet in which the whole wheat was replaced by white flour.

Whole wheat improves the appetite so that the mice receiving it consumed twice the food eaten by those on white flour.

The gain in weight per unit of food consumed was doubled by using the whole wheat.

From the standpoint of health and life, whole wheat is incomparably superior. The mice on it were healthy, happy and contented. Many of those on white flour developed paralysis and three died.

Those on whole wheat had much greater resistance to cold weather.

The fur of the white flour group became clumped and abnormally oily.

When the white flour mice were given the whole wheat diet, they rapidly regained weight, their fur became normal, and they seemed contented, thus furnishing positive, as well as negative, proof of the superiority of whole wheat.

The dietary difference between white and whole wheat flours is largely a difference in vitamin B. Modern milling removes this necessary food factor.

This experiment demonstrated that the cost of food per gram of weight gained was 4.9 cents on a diet containing white flour and 3.7 cents on one containing whole wheat. For nutritional purposes, whole wheat flour is worth nearly twice as much as white flour.

The presentation of facts such as these to parents and teachers wins their support to scientific feeding and will lead, the author trusts, to healthier and happier future generations.

R. N. ANDREWS, M.D.

GYNECOLOGY AND OBSTETRICS

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DIABETES, PREGNANCY, AND INSULIN: Henneberg and Bickel (Gynecologie et Obstetrique, July, 1925). This report comes from Beuttner's clinic in Geneva and concerns the successful treatment with Insulin of a case of true diabetes during gestation. The authors refer to the confusion of statements concerning the frequency of this association and of the prognosis. They believe that pregnancy rarely occurs in a diabetic woman and that there is a tendency to sterility, certainly in established cases of diabetics. Because of the increase of fat, the disturbed metabolism, pregnancy is not likely to occur, and the organism does not become adapted to the nutrition of the fetus. Sexual apathy is common in diabetes, and atrophic changes in the uterus and ovaries develop early in the disease.

On the other hand, pregnancy is frequently complicated by transitory disturbances in the carbohydrate metabolism. The authors recognize four types of the condition: 1. Pseudo-glycosuria, which is really a lactosuria, is not influenced by dietary restriction, is transitory, and is not an indication of predisposition to diabetes. 2. Alimentary glycosuria refers to a slight disturbance in the carbohydrate metabolism, which is usually benign in its effect. This usually appears in the latter months of pregnancy and may amount to several grams of glucose to the liter, but is not accompanied by any of the other evidences of diabetes, and disappears on regulating the diet. It is recognized as a transitory overloading of the liver. It is now accepted that many of the so-called alimentary glycosurias are really instances of (3) "Renal Glycosuria," which is also a benign condition. The clinical evidences of true glycosuria are absent. The glycosuria is likely to persist in spite of dietary treatment, but disappears after labor. The fourth group concerns the cases of true diabetes characterized by definite hyperglycemia, which is influenced by diet, and accompanied by the usual symptoms of diabetes. It is important that any case of glycosuria be studied and placed in the proper group. The prognosis is favorable for the first three types of condition, provided certain dietary principles are followed. The fourth type, however, presents serious possibilities both for mother and baby. It is not impossible that what is apparently a simple glycosuria will reappear in subsequent pregnancies as a true diabetes. Many of the statements concerning the prognosis of diabetes and pregnancy come from the various standards of diagnosis and failure to eliminate the simple glycosurias.

The author states that of the cases of true diabetes in the pregnant woman about one-half die in the course of pregnancy, labor or within a few months. The immediate fetal mortality is about 55 per cent, and many more die within the first few days after birth.

Interruption of pregnancy is not advised, since postoperative exacerbation of glycosuria and acidosis with coma are common. They consider the only course is active medical and dietary treatment of diabetes, together with proper dosage of insulin. A case is reported which presented all of the signs of diabetes developing during pregnancy and was admitted to the hospital in coma. Intensive medical treatment with customary doses of insulin resulted in amelioration of the symptoms, successful delivery of a healthy baby, and final clearing up of glycosuria and acidosis. They believe that the prompt and active use of insulin will enable the obstetrician to carry such patients safely through the latter months of pregnancy and save a large per cent of the newborn.

ARCHIBALD L. McDONALD, M.D.

ROENTGENOLOGY

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ROENTGEN RAY STUDY OF 926 CASES OF RICKETS: Groover, Christie & Merritt (Radiology, Vol. 5, p. 189, Sept., 1925). The technic is difficult and the exposure must be extremely rapid. Good detail in the roentgenogram is imperative.

A clinical diagnosis of rickets was made in 68.7 per cent of these cases, an X-ray diagnosis in 66.5 per cent. In the incipient cases, it appears that the *x*-ray diagnosis is far more accurate than the clinical.

The findings are most characteristic in the distal end of the ulna, but in the florid cases can be found widely distributed. A "beaker" shape at the epiphyseal line of the ulna with a loss of bone density in the distal end of the femur are the earliest signs. Later there is irregularity, loss of distinction in the zone of proliferation, periosteal thickening, irregularity of the epiphysis, flattening of the upper end of the tibia, curvatures, cortical density along the curvatures. The cupping of the metaphysis and its irregularity are most characteristic.

Fractures are frequent, and when healing occurs there is markedly excessive callus, in no orderly arrangement. Cystic areas may be present in the shaft.

Healing is indicated by either a dense white line of calcium in the zone of proliferation or increased density at the ends of the shaft, combined with the obliteration of the irregular cupping.

Differential diagnosis of the florid type is not difficult. Lues is not so uniformly distributed and shows bone distinction and production. The metacarpals, if involved, usually indicate a luetic origin. When both lues and rickets are present in the same bone it is almost impossible to distinguish them.

LEO G. RIGLER, M.D.

THE ROENTGEN ASPECT OF EMPYEMA IN CHILDREN: Carty & Liebman (Am. Jour. Roent., Vol. 14, p. 215, Sept., 1925). The thorax of a child is so small that a considerable collection of fluid is impossible. As a result the rib shadows and the costo-phrenic sinus are not always obliterated even with an apparently extensive effusion. The visibility of the costo-phrenic sinus in 28 per cent of the cases was notable.

Displacement of the mediastinum occurs readily and assymetry of the chest or scoliosis of the spine may be seen early. Careful placing of the child in position is important, as displacements of the heart or deformities of the chest may be simulated, if the chest is not held straight.

Change in position produces a change in shape and density of the shadow in certain cases, particularly where the amount of fluid is small. Plates were therefore taken in both prone and sitting positions.

Pneumonia can be differentiated by the rapid changes in its appearance, the absence of a fluid line, the less homogeneous shadow, and the limitation to a lobe. Thickened pleura does not change with change in position and the mediastinum is likely to be displaced toward the lesion rather than away from it. The latter helps differentiate massive collapse also.

Pericardial effusion may be simulated by mediastinal empyema.

The position of the tube after a drainage operation should be carefully watched.

LEO G. RIGLER, M.D.

DEEP ROENTGEN THERAPY OF MAMMARY CARCINOMA: Evans and Leucutia (Am. Jour. Roent., V. 14, p. 135, Aug., 1925). Mammary carcinomata may be classified into five groups: 1. A small single, freely movable focus. 2. A large carcinoma with involvement of axillary glands. 3. Involvement also of supra- and infra-clavicular glands. 4. Thoracic involvement. 5. Abdominal or general carcinomatosis.

The first two should be treated by surgery with post-operative radiation within 10 to 12 days. This should cover a very wide area, attempting to radiate all parts to which dissemination might occur by continuity through the lymph plexus. It is upon the manner of dissemination that the final outcome will depend. The whole anterior and posterior chest, including the cervical region, the arm, and the upper abdomen on the side of the lesion are thus radiated. The area extends to the other side, well beyond the mid-sternal line.

The dosage is comparatively moderate, using 90 per cent S.U.D. as a standard with shortwave rays, heavy filtration, long focus skin distance, and large portals of entry.

The results of surgery with post-operative radiation are apparently far better than of surgery alone, insofar as their experience indicates.

In the remaining three groups radiation therapy should always be used, as they are inoperable. Palliation is usually obtained and in a few cases apparent cures have resulted.

LEO G. RIGLER, M.D.

EYE, EAR, NOSE AND THROAT

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PHLYCTENULAR CONJUNCTIVITIS AND KERATITIS: CAUSES AND PREVENTION: N. Bishop Harman, M.A., M.B. (British Medical Journal, August 29, 1925, p. 379). Next to ophthalmia neonatorum, phlyctenular kerato-conjunctivitis is the most frequent cause of educational blindness from superficial ocular inflammation among school children. A number of etiologic factors are of importance:

(1) The social factor—poverty and bad food—is a predisposing cause.

(2) The age incidence—rare under one year, thence gradually increasing up to the age of 5, after which there is a steady decline. At this maximal age, what with nasal catarrh, herpetic lips and facial impetigo, there is more than sufficient irritation to the fifth nerve to produce a localized reaction.

(3) The seat of election in 66 per cent of the cases was at or near the lower and outer sector of the limbus, an area innervated by a loop formed by a small branch from the lachrymal nerve, and from the second division of the fifth. Here again it would seem that a fifth nerve irritation might stand in direct causal relationship. The branch from the lachrymal may also explain the profuse lacrymation in this disease.

(4) The possibility that this may be a local, ocular infection is dispelled by the absence of bacteria in fresh, unbroken phlyctenules.

(5) This malady has no seasonal incidence, and so is unlike most other forms of conjunctivitis.

(6) The histologic structure is that of a minute blister. All these points bear out the idea that the disease is not primarily a local, but a constitutional one.

While it is possible that tuberculous children are more frequently subject to phlyctenular lesions than the non-tuberculous, it is probably the lowered vitality and enfeeblement incident to lack of proper food, of sunshine and fresh air which is primarily to blame, and not the presence of tuberculosis.

The prevention of this disease involves general social improvement. In particular, careful watch must be made for children of generally debilitated condition, and for those with infected mouths or throats. Open air schools and appropriate dental and throat treatment are essentials if phlyctenular lesions are to be eradicated.

VIRGIL J. SCHWARTZ.

BOOK REVIEWS

BASAL METABOLISM. Eugene F. Du Bois. 1924. Lea & Febiger.

This monograph is a comprehensive discussion and survey of the present knowledge of basal metabolism. It is quite evidently the result of years of study and experimentation and observation on the part of the author and his assistants, together with a thorough review of literature on this subject.

There is a brief history of the study of metabolism, and metabolism of fat, carbohydrate and protein is discussed. A review of the laws of physics which bear on the study of basal metabolism together with discussions of gases of the body and of the general principles of apparatus used and methods of calculation, are given consideration. Discussion of relation of basal metabolism and surface area follows consideration of normal basal metabolism levels and methods of surface area determinations as well as conditions which cause variations in basal metabolism in the normal individual.

The value of basal metabolism determinations in disease is gone into extensively in undernutrition, overnutrition, diabetes and disturbances of thyroid, adrenal, pituitary and sex glands. The value of basal metabolism determinations in diabetes as aiding in prognosis and in thyroid disease as aiding in diagnosis and prognosis, is shown.

Effect of fever on basal metabolism is discussed with especial consideration being paid to tuberculosis, pneumonia, syphilis and cholera and also the importance of water metabolism and maintenance of nutrition is stressed in febrile diseases. There is a short study of basal metabolism in nervous and mental disorders and of the effect of drugs on metabolism with numerous references to recent literature.

This text is valuable for reference especially to the student of diagnosis. It is written in a concise manner and contains a great deal of valuable information dealing with the metabolism and nutrition. L. R. CRITCHFIELD, M.D.

WANTED—Experienced secretary desires medical secretarial work—Minneapolis or St. Paul preferred. Experience obtained in well known Clinic. Splendid references. Address C-61, care MINNESOTA MEDICINE.

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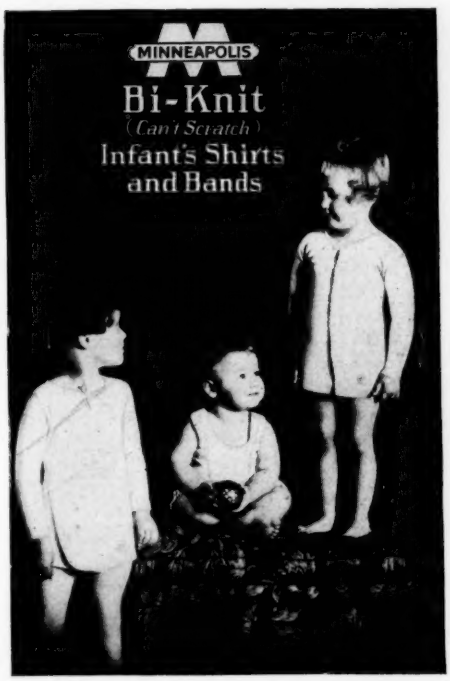

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